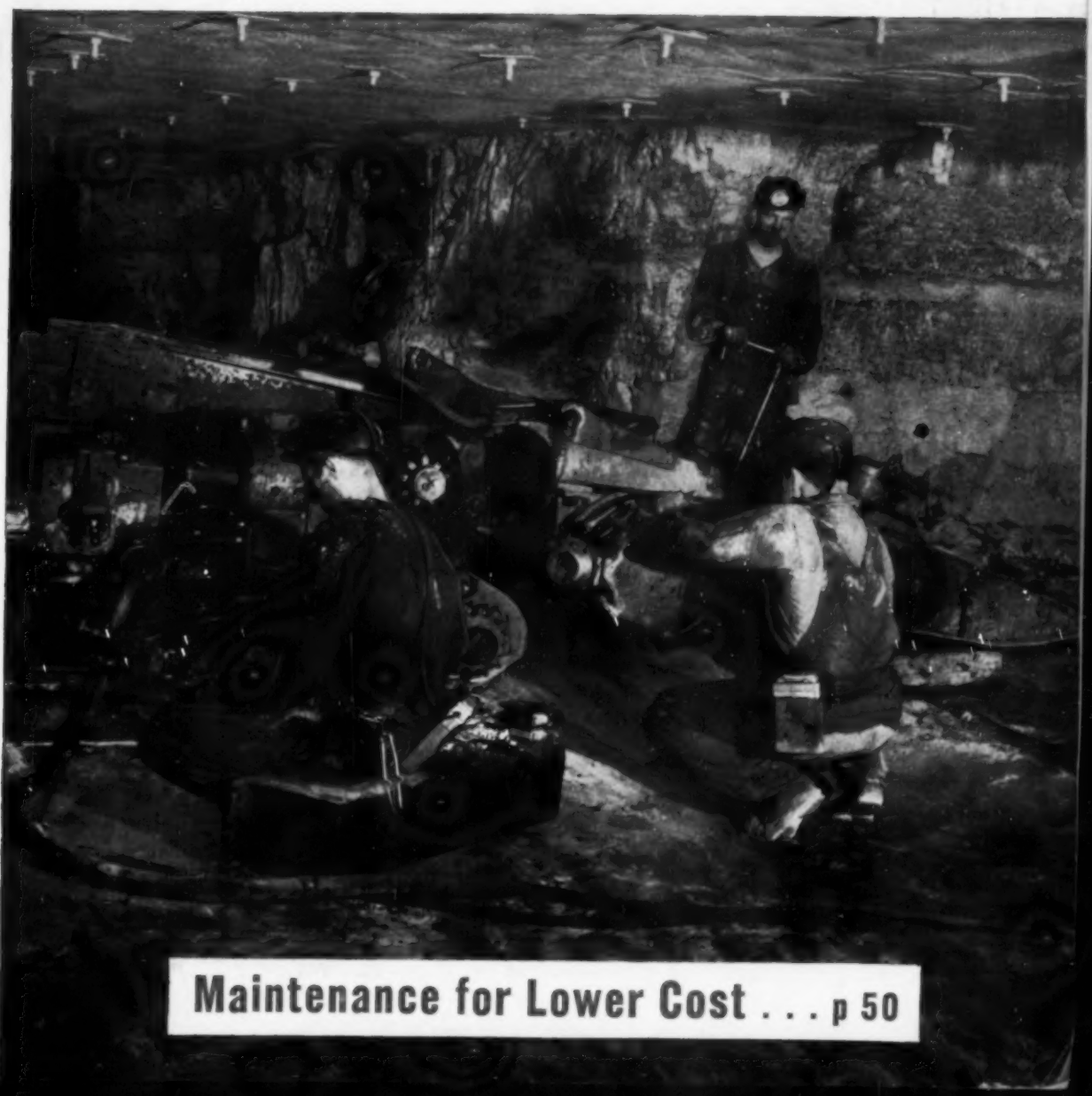
Coal Age

JULY, 1954

A McGRAW-HILL PUBLICATION—PRICE 50c



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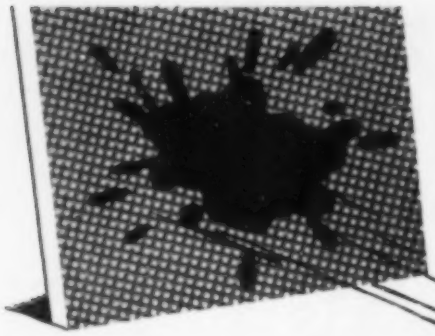
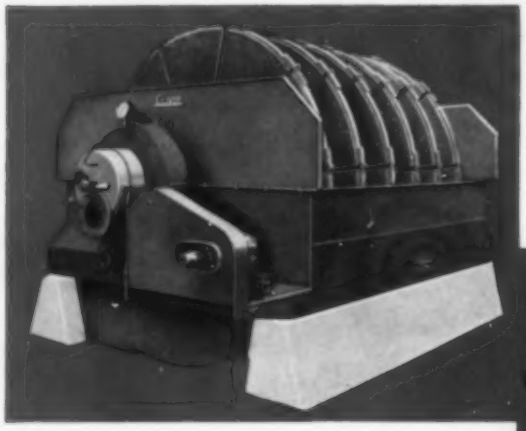
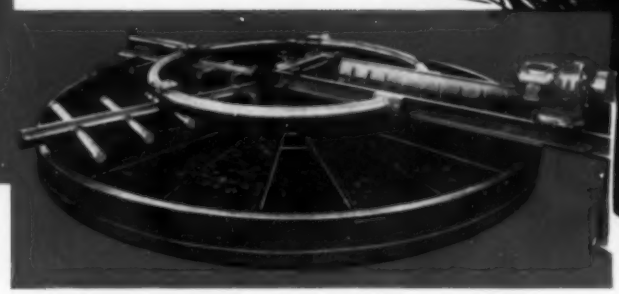


COAL DEWATERERS...

that don't slam the fines around





This may be an idea for your coal operators who (1) must take the fines out of your washery discharge but (2) want those fines recovered with as little degradation as possible.

To accomplish objective No. 1 you will need an efficient dewaterer with plenty of hydraulic and sludge handling capacity and with efficient cake discharge.

To accomplish objective No. 2 you will need a dewaterer that handles the sludge gently . . . that doesn't slam the fines around.

You can accomplish both objectives by using either the Oliver Horizontal Filter (right) or the American Disc Type Filter (left) or both, depending upon the characteristics of the fines. They're both continuous vacuum dewaterers with exceptionally high capacity and solids retention values. Each shows less than 1% solids in the filtrate.

Our filtration engineers, who have had plenty of coal dewatering experience, will be glad to discuss your problem and work out the best fines dewatering system for your plant.

WORLD WIDE SALES, SERVICE AND MANUFACTURING FACILITIES

OLIVER UNITED FILTERS INC.

NEW YORK 36 — 33 West 42nd Street • CHICAGO 1 — 221 North LaSalle Street
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RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

4½-mile conveyor uses B. F. Goodrich cord belts

THAT belt above is one of 14 on one of the longest outdoor conveyors in the world. As you can see, the belts must travel up steep hills and over rough ground. When the engineers planned the system, they specified B. F. Goodrich cord belts for these tough hauling sections.

Unlike the usual conveyor belts made of rubber and layers of fabric, the B. F. Goodrich cord belt is made with layers of separate cords, each surrounded by rubber, running the length of the belt. The cords make the belt strong so it can pull the load up steep hills and still be flexible enough to prevent spilling.

B. F. Goodrich cord belts handling wet material give double protection against mildew and rot. Since each cord is completely surrounded by rubber, a cut in the belt admits moisture to only those few cords exposed. There are no cords running across the belt to absorb and carry moisture. In addition, the belts are treated with special chemicals which protect against mildew.

This system hauls 800 tons an hour over the kind of ground you see above. The 36-inch wide belt travels 600 feet a minute delivering 800 tons of coal an hour from mine to electric power plant.

Whatever you move by belt—coal, rock, ore, sand, gravel, dirt—there is a B. F. Goodrich conveyor belt that can do it better and for less. Your local BFG distributor can show you how these longer-lasting belts can save money, or write *The B. F. Goodrich Company, Dept. M-262, Akron 18, Ohio.*

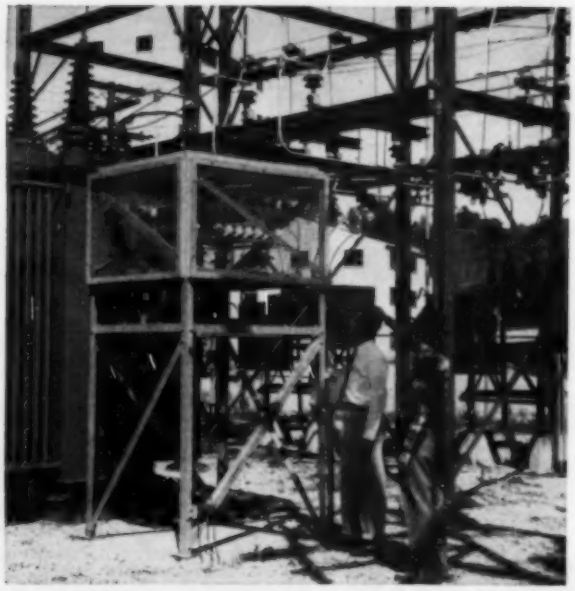
B.F.Goodrich
INDUSTRIAL PRODUCTS DIVISION

ENGINEERING REPORTS:

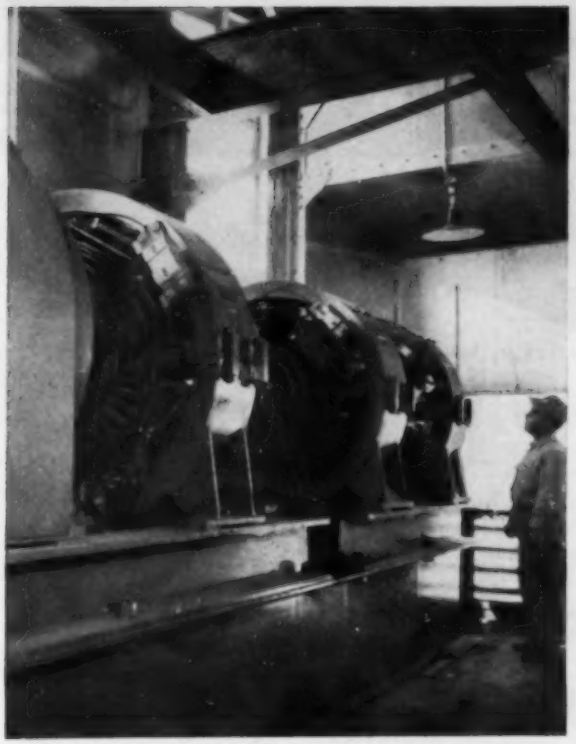
MINIMUM CYCLE TIME on this huge shovel—bucket capacity, 45 cubic yards—and other three shovels at mine is accomplished with help of pin-point control of G-E amplidyne system. Dependable G-E motors and motor-generator sets power shovels.

New Ohio coal mine to produce

ON-THE-SPOT CONTROL OF ENTIRE MINING OPERATION is provided by G-E 2-way radio system from Zanesville headquarters, 48 miles away. Result: outage time is kept low.



MINIMUM POWER LOSSES with this G-E substation which is located near work area. Neutral grounding assures minimum shutdown, maximum protection for personnel and equipment.



ROUND-THE-CLOCK SHOVEL OPERATION—thanks to this five-unit G-E motor-generator set. Split frames of m-g sets, specially designed for shovels, assure ease of maintenance.

INSTANTANEOUS CONTROL of shovels' hoist, swing and crowd motors provided by G-E amplidyne control. System uses fewer components, guards against torque peaks.

5,000 tons/day for power plant

General Electric equipment to help Muskingum mine reach peak output

The new Muskingum Mine, Morgan County, Ohio, soon will be furnishing 5000 tons of strip-mined coal per day to the Ohio Power Company's nearby Muskingum River Plant. In a continuous stream, the coal flows from the mine through the preparation plant, and then to the power station.

Four shovels—all powered and controlled by G-E equipment—are used at this mine. Two of them—one with a bucket capacity of 45 cubic yards—will handle the overburden to a projected highwall of 80 feet. The two smaller shovels load the coal. A G-E equipped substation provides power for the shovel operation.

To integrate the mining, processing production, the mine's Zanesville headquarters—48 miles away—uses a G-E two-way radio system. Eight units are located in the shovels, dispatch cars, and mine office.

You can take advantage of the same expert G-E electrical engineering that went into this system, no matter how large or small your mining project may be. When you specify General Electric, its many specialized services—product development, system engineering, field engineering, to name but a few—are available to you. Your local G-E Apparatus Sales Representative can tell you more. General Electric Co., Schenectady 5, New York. 660-40

Engineered Electrical Systems for Coal Mines

GENERAL ELECTRIC

FIVE THINGS YOU WANT YOUR FINE COAL DEWATERING EQUIPMENT TO DO

1 **REDUCE MOISTURE TO THE MINIMUM**

Bird Coal Filters get the fine coal as dry as can be obtained by mechanical means — dry enough for direct loading or for economical thermal drying.

2 **DO THE WHOLE JOB**

With Bird Coal Filters you don't have to screen the feed before dewatering. All the fine coal is recovered.

3 **TAKE OUT THE MOISTURE RETAINING SLIMES WITHOUT LOSS OF COAL**

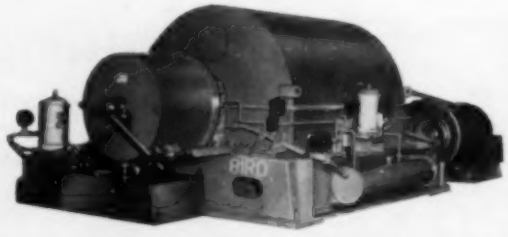
With Bird Coal Filters, these particles that can hold as much as half the total moisture content are removed by a simple rinsing operation — something no other dewatering equipment can do.

4 **RUN CONTINUOUSLY FOR MONTHS AT A TIME**

Non-stop operation is possible only with the Bird. It employs no screens. It runs and keeps on running day in and day out.

5 **COST AS LITTLE AS POSSIBLE TO OPERATE AND MAINTAIN**

Bird Coal Filters cost as little as five cents per ton to run. Maintenance averages 2 cents or less per ton. Compare these figures with those of any other dewatering equipment.



BIRD MACHINE COMPANY
SOUTH WALPOLE, MASSACHUSETTS

ONLY THE BIRD COAL FILTER GIVES YOU ALL FIVE

Coal Age

JULY • 1954

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Better Management Today

LEAD–OFF FEATURE in August *Coal Age* will be a staff-written report describing how leading coal companies are modernizing their management to match modern mining machines and methods and keep their companies operating profitably under present competitive conditions. Today, mining companies are putting a high premium on special skills and informed good judgement among their officials. What some of the progressive firms look for, how they find the needed skills, how they attack pressing problems are only three of the important aspects discussed.

Also Coming in Coal Age

How top-notch preparation and efficient deep mining were combined to keynote Freeman Coal's new Crown mine, a $10 million development designed for producing and cleaning 2,000,000 tons annually from a 26,000-acre tract of Illinois No. 6 coal.

Power Distribution for AC Mining Machines. A detailed discussion of a system and equipment providing safety for men and machinery and permitting ready circuit extension with sectionalized cable.

"42 Years in Coal Stripping"— The career of Robert H. Sherwood, chairman of the board of the Stonefort Corp., who 42 yr ago helped pioneer modern coal stripping and is still a pioneer at heart. Described in detail also is the latest example of the company's progressive operation, the unusual new 700,000-tons-per-year Will Scarlet mine.

The architect and mining man, working together, can provide mine buildings that improve production, please the eye and quite often cost less than their outmoded predecessors, as the "modern" surface facilities at one Pennsylvania mine well proved. You never saw a change house like this before!

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GREASE-LUBRICATED ball and roller bearings in mine locomotives, cutters, loaders and other equipment in mines and preparation plants need a premium-quality lubricant — *Texaco Regal Starfak* — to assure:

1—LONGER BEARING LIFE: *Texaco Regal Starfak* gives full, continuous protection against wear and rust . . . stands up where other greases fail.

2—LOWER MAINTENANCE COSTS: *Texaco Regal Starfak* stays *in* the bearings and retains its stability under severe operating conditions. It is strides ahead of ordinary grease in resistance to oxidation. It does not form gum and performs efficiently over a wide temperature range.

3—LOWER LUBRICATION COSTS: *Texaco Regal Starfak* resists leakage and washout, stays on the job longer. Fewer applications are needed.

4 — HIGHER PRODUCTIVITY PER MACHINE: *Texaco Regal Starfak* assures smoother, more efficient operation, keeps machines working without unscheduled stoppages, reduces down time.

For effective lubrication of wire rope and open

TEXACO

TEXACO

FOUR using

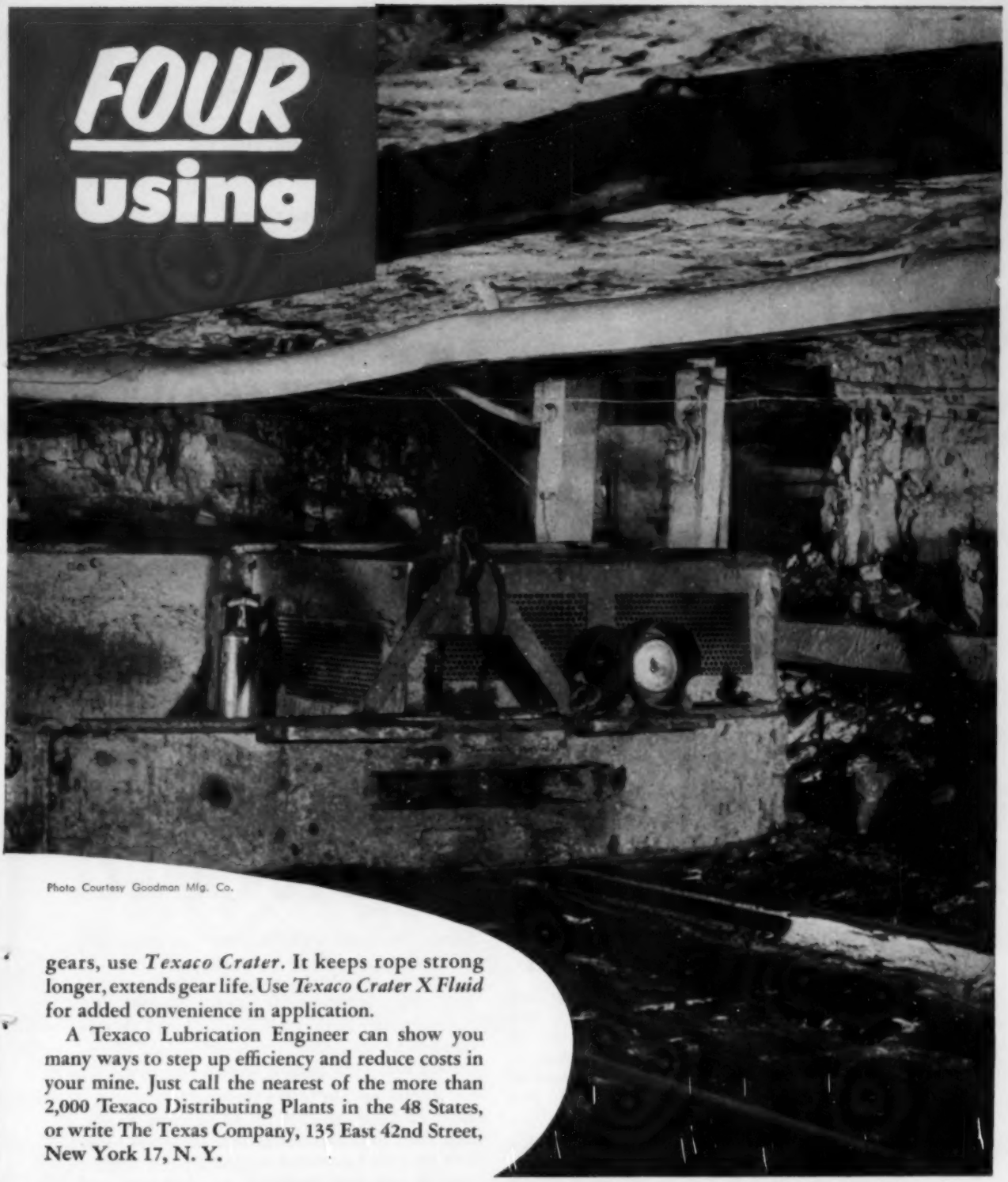
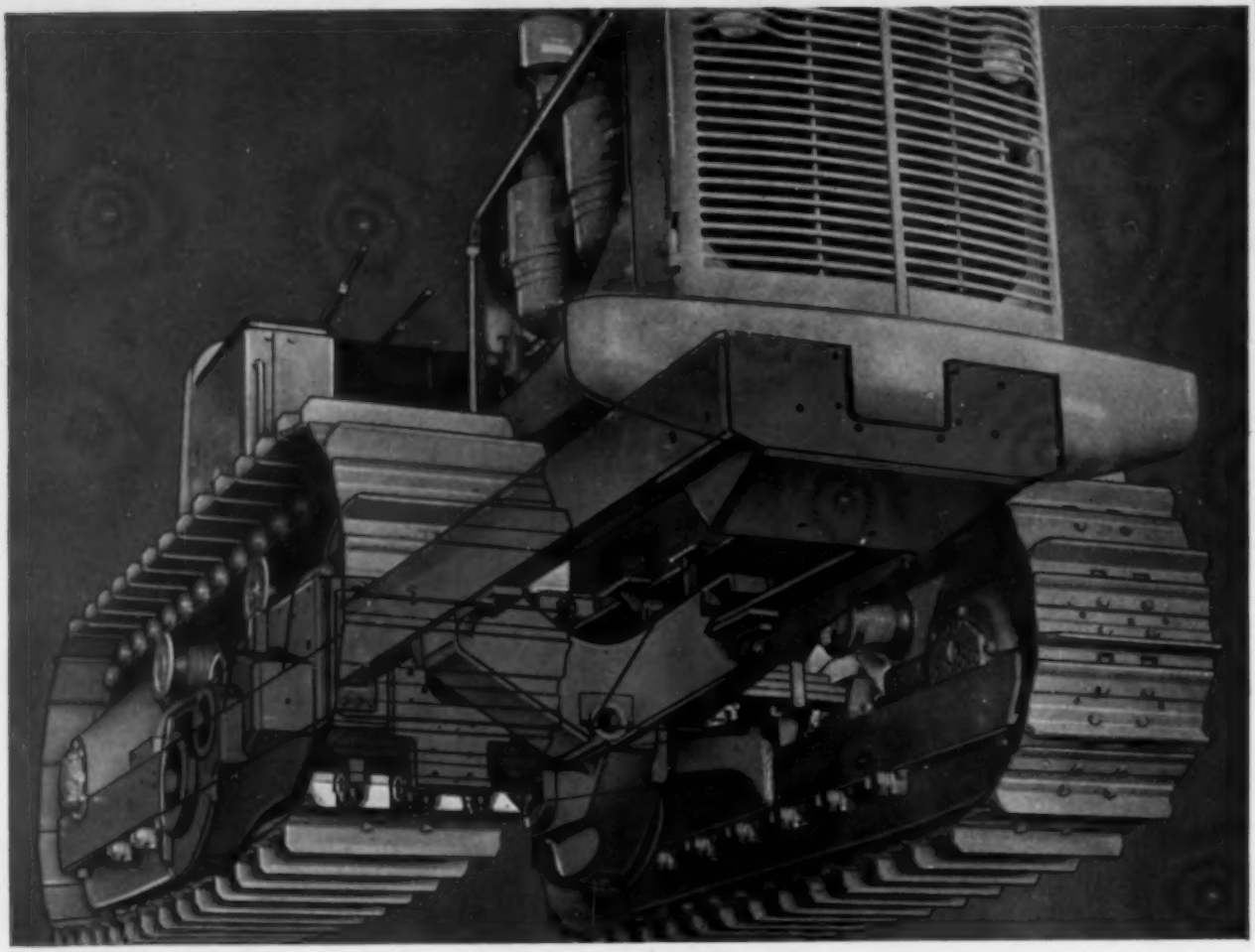


Photo Courtesy Goodman Mfg. Co.

gears, use *Texaco Crater*. It keeps rope strong longer, extends gear life. Use *Texaco Crater X Fluid* for added convenience in application.

A Texaco Lubrication Engineer can show you many ways to step up efficiency and reduce costs in your mine. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

LUBRICANTS for the Coal Mining Industry



HOW THE MAIN FRAME CONTRIBUTES TO TOP TRACTOR PERFORMANCE

All-Steel Box A-Frame is a Key to Outstanding, Low-Cost Record of Allis-Chalmers Tractors

Mine operators everywhere are putting new emphasis on shrewd equipment buying. And rightly so. To increase production, stay on schedule and make a profit in the face of today's high costs, they have to be *sure* of getting top value in design, performance and service features.

More and more of these mine operators are now using Allis-Chalmers tractors. One of the big reasons is hidden in the heart of the tractor. It's the exclusive design which characterizes the main frames of all four Allis-Chalmers tractors. These frames are one-piece, all-steel, welded structual members (like the girders in a bridge or the columns in a building). They help provide greater strength and flexibility to withstand shock loads, better equipment mounting, improved weight distribution and outstanding service simplicity.

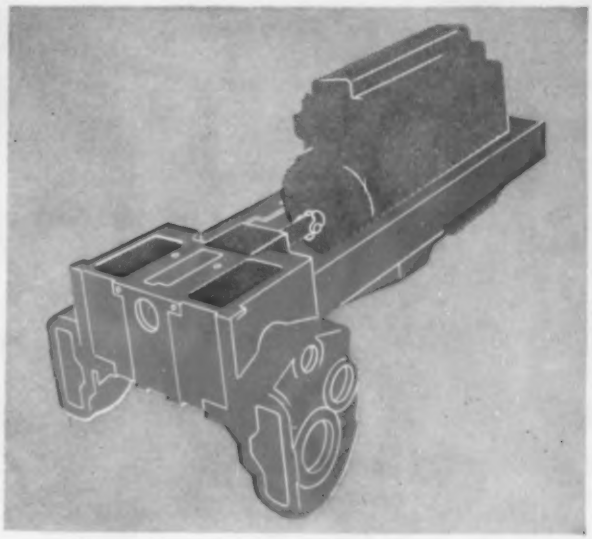
We invite you to see these advantages . . . first at your nearby Allis-Chalmers dealer, and then in a demonstration. Whichever size you may be interested in, you'll see a tractor that is not just modified . . . but designed new-from-the-ground-up to meet the needs of today's jobs.

ALLIS-CHALMERS
TRACTOR DIVISION · MILWAUKEE 1, U. S. A.

"Rolls with the Punch" — The resiliency of the high-tensile steel main frame enables it to flex slightly under extreme shock loads . . . without transmitting the strain to engine, clutch or transmission . . . thus offering extra protection to the complete machine.

Weight Distribution Designed for Today's Jobs— Box A-Frame lets Allis-Chalmers use a modern engine . . . locate main parts for best over-all balance . . . put more weight lower in tractor where it does the most good . . . make the tractor "built to take it."

Better Equipment Mounting — Designed to best serve changing tractor application (today over 70 percent of all tractor equipment is mounted), this compact main frame allows bulldozers to be mounted in close . . . provides ample clearance for equipment like front-end shovels . . . permits wide track shoes . . . improves performance of the entire unit.



Unit Construction for Service Simplicity — Since the main frame carries the *structural* load, power drive components are designed to do only their specific jobs. They can be readily removed, repaired or replaced without disturbing adjacent parts . . . saving service time . . . actually cutting down time because assemblies can easily be serviced under shop conditions if desired.

HD-20	HD-15	HD-9	HD-5
Weight 41,000 lb Hydraulic Torque Converter Drive 175 net engine hp	Weight 28,000 lb Choice of standard transmission or hydraulic torque converter drive	Weight 18,800 lb 72 drawbar hp	Weight 11,250 lb 40 drawbar hp

Increase your footage

Use CLEVELAND Air Legs and Drills...the easiest way

THE FEED YOU NEED — FROM ZERO FEED TO FULL LINE

Eleven detent positions enable drill operator to set and maintain pressures in a range from zero to full-line feeding pressure — with an increase of 9 psi at each setting. That's why a CLEVELAND Air Leg and H10AL Drill combination gives top performance in any kind of rock.

Shown here is a **CLEVELAND AL-92** Telescopic Air Leg with H10AL Drill. Because of space limitations, full length isn't shown.

CLEVELAND AL-92 Telescopic Air Leg with H10AL Drill and exclusive 11-position feed control

SPECIFICATIONS

Standard, automatic controlled wet-type backhead.

Chuck Sizes	7/8" x 4 1/4" — or other popular steel shank sizes	
Weight, Drill	60 lbs.	
Air Hose	3/4"	
Water Hose	1/2"	
Full Feed Travel	4'	6'
Collapsed Feed	2' ea. piston	3' ea. piston
Closed Length	48"	60"
Extended Length	96"	132"
Air Leg Weight	37 lbs.	42 lbs.

CLEVELAND AL-90 Single Extension Air Leg for use with H10AL Drill and exclusive 11-position feed control

SPECIFICATIONS

Weight, Drill	60 lbs.
Air Hose	3/4"
Water Hose	1/2"
Feed Travel	36" — 48" — 60"
Closed Length	56 3/4" — 69" — 81 1/4"
Extended Length	92 3/4" — 117" — 141 1/4"
Air Leg Weight	30 lbs. — 34 lbs. — 37 lbs.

CLEVELAND AL-91 Single-Extension Air Leg for use with any 35-lb., 45-lb., or 55-lb. class rock drill. Feed control built into air leg.

SPECIFICATIONS

Standard wet, or automatic controlled, wet-type backhead available.

Air Hose	3/4"
Water Hose	1/2"
Feed Travel	36" — 48" — 60"
Closed Length	58" — 71" — 83"
Extended Length	94" — 119" — 143"
Air Leg Weight	35 lbs. — 38 lbs. — 41 lbs.

per man-shift!

to drill rock

Choose the drilling combination that's best for you from the industry's only complete line of telescopic or single-extension air legs.

MINERS like to use a CLEVELAND Air Leg and H10AL Drill combination. It gives them real flexibility — they can use it as a drifter . . . as a stoper . . . or as a hand-held drill . . . set-ups are quick and easy.

It's an easy-handling combination, also. The air leg supports the drill and absorbs fatiguing recoil. You get flexible feeding pressure, too — from zero to full line. That's why miners drill more footage with CLEVELAND, yet are less tired at the end of their shift.

Exclusive CLEVELAND built-in feed control in the H10AL Drill eliminates a third hose and cumbersome "Y" connections. There's no feed-control bleed valve — the operator doesn't have to bleed off air continuously, to maintain suitable feeding pressure. He can change or advance the position of the leg easily and quickly.

The air leg holds the drill in line with the hole — thus reducing front-end drill wear and practically eliminating rotation strains.

These are ways a CLEVELAND Air Leg and H10AL Drill combination helps you get more drilling for less cost. Take advantage of them.

Write today for Bulletin RD-30 for complete information.

CLEVELAND AL-93 Telescopic Air Leg for use with any 35-lb., 45-lb., or 55-lb. class rock drill. Feed control built into air leg.

SPECIFICATIONS

Full Feed Travel	4'	6'
Collapsed Feed	2' ea. piston	3' ea. piston
Closed Length	50"	62"
Extended Length	98"	134"
Air Leg Weight	42 lbs.	47 lbs.

LE ROI

CLEVELAND ROCK DRILL DIVISION

Le Roi Company

A Subsidiary of Westinghouse Air Brake Co.

12500 BEREA ROAD • CLEVELAND 11, OHIO RD-59

Plants: Milwaukee, Wisconsin • Cleveland — Greenwich — Dunkirk, Ohio • Coldwater, Michigan

ANOTHER WAY YOU SAVE WITH FORD *TRIPLE* ECONOMY

T-Series Chassis-Cab models fit any special purpose body from 9 to 19 ft., give you up to 3,800 lbs. more payload than other make 6-wheelers.

New Ford Tandem-Axle Big Jobs

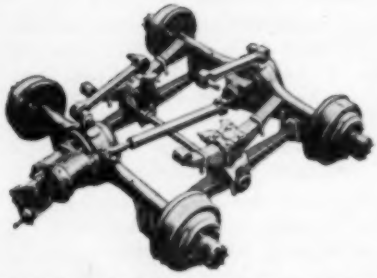
factory-built for low first-cost!

The new Ford T-700 and T-800 BIG JOBS bring famous Ford performance and economy to the extra-heavy-duty field. Ford's mass-production methods keep quality high, first costs low. You get much larger body and payload capacities—up to 95% more on the T-800 than F-800—within legal axle weight limits of most states.

Three new engines up to 170 h.p.—Ford's new LOW-FRICTION, overhead-valve V-8 engines give you low piston speeds, up to 50% longer engine life and more gas-saving power. All-new 138-h.p. *Power King* V-8 and 152-h.p. *Cargo King* V-8 for T-700, and 170-h.p. *Cargo King* V-8 for T-800, develop up to 44% more power per cubic inch than other engines in their class.

New *Master-Guide* Power Steering is standard on the T-800 and on the T-700 (with 152-h.p. engine). Operative at all times, it cuts steering effort as much as 75% and practically eliminates road shock to the steering wheel. New Ford *Driverized* Cab and controls provide comfort and driving ease to help the driver do hard jobs faster, with less effort.

For complete information, see your Ford Dealer, or write: Ford Division, Ford Motor Co., Dept. T-77, Box 658, Dearborn, Mich.



New Ford factory-installed tandem rear axles are the most modern in the industry. Rubber-bushed suspension reduces shock, minimizes lubrication needs. Power divider with 3rd differential equalizes driving power for longer tire life. Lockout feature standard.

SAVE WITH *ALL THREE!*

1. Gas-Saving Power! **2.** Driver-Saving Ease!
3. Money-Saving Capacities!
And . . . Ford Trucks last longer, too!

FORD *TRIPLE ECONOMY* TRUCKS

MORE TRUCK FOR YOUR MONEY!

ALLIS-CHALMERS

Totally-Enclosed Fan-Cooled MOTORS

INDOORS or OUT

DIRT and CORROSION

Can't Hurt These Motors

Here is a totally-enclosed type of motor that will solve many of your dirt and corrosion problems. Install anywhere, indoors or out.

Cooling System is Self-cleaning

Cooling air is carried through the heat-exchanger tubes with sufficient velocity to expel practically any kind of dirt. If oily or sticky dirt should cling, tubes can be ramrodded clean in a few minutes because tubes are straight and tube ends are exposed.

Choice of Corrosion-resistant Materials

You can lick corrosion with this motor, too. Tubes are available in a variety of materials to meet practically any corrosive atmospheric condition. Allis-Chalmers tube-type motors have long and successful experience in such difficult applications as caustic plants, refineries and petrochemical plants, power plants with fly ash problems and many others.

Next time you need a motor for a dirty or corrosive location or for outdoor operation in all kinds of weather, call your Allis-Chalmers District Office. Get complete information on Allis-Chalmers tube-type totally-enclosed, fan-cooled and explosion-proof motors. Or write Allis-Chalmers, Milwaukee 1, Wisconsin, for Bulletin 51B7149. Available in ratings on frames larger than NEMA 505 up to 3000 hp. A-4222

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Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Distributors, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

***TEXROPE* V-belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.**

PUMPS — Integral types from ¾ in. to 72 in. discharge and up.

ALLIS-CHALMERS

A group of 5 HP Midget Blowers ready for shipment.

The sturdy, portable 1½ HP Midget Blower.

Get higher PRODUCTION through proper VENTILATION with **JEFFREY FANS** *and* **BLOWERS**

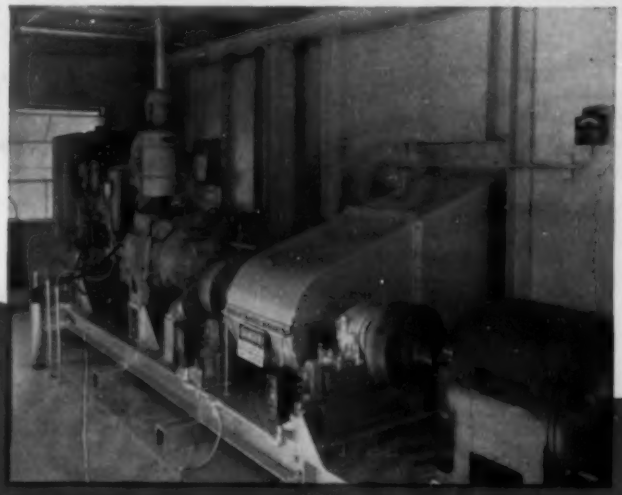
Proper mine ventilation is a sure way to raise production. Fresh air makes miners feel safer and healthier. Their morale goes up. So does production. Ask one of the hundreds of bituminous or anthracite mine operators who have installed fans and blowers built by Jeffrey—a leader in mine ventilation engineering since 1909.

Years of research and development, experience with fan and blower installations under every conceivable condition, the best in material and workmanship—all are yours from Jeffrey. Jeffrey fans and blowers deliver with peak efficiency . . . are economical to operate, and low on maintenance.

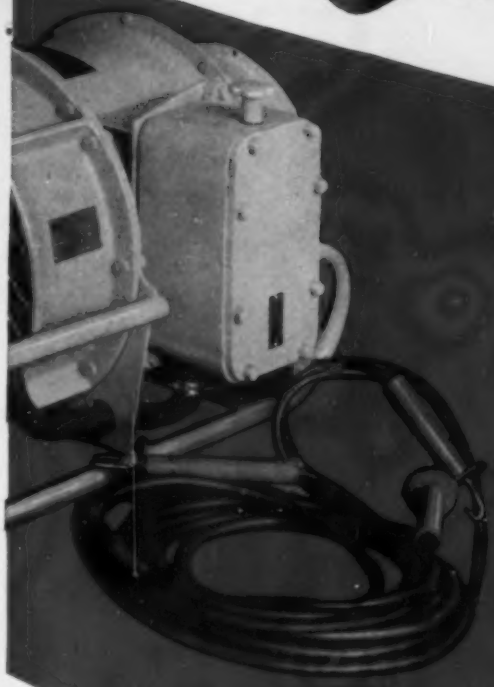
Jeffrey's fan and blower line, in both open and permissible types, includes: AERODYNE Fans for 20,000 to 500,000 CFM up to and including pressure of 20 WG; AERODYNE JR. Fans for 5,000 to 150,000 CFM not to exceed pressure of 4 WG; and blowers and exhausters for use with tubing for auxiliary, room, or hard-to-reach ventilation, including AERODYNE Midget Blowers, Type 61 Blowers, and Universal Blowers.

Write for Catalog 797 for complete details.

At left: Self-contained Universal Blower can be set at eight different angles for blowing or exhaust.



Motor drive for AERODYNE Fan, showing auxiliary gasoline power unit which cuts in automatically if electric power fails.



AERODYNE Fan installation at mine of a large steel company.

THE JEFFREY MANUFACTURING CO.

ESTABLISHED 1877

Columbus 16, Ohio

sales offices and distributors in principal cities

PLANTS IN CANADA, ENGLAND, SOUTH AFRICA.

IF IT'S MINED, PROCESSED OR MOVED
. . .IT'S A JOB FOR JEFFREY!

"I was promised delivery today,

but now I'm told you've no stock of one rope and only half enough of another. This delay is costing me money and plenty of it. From now on it's Roebling for me!"

* * *

You can count on prompt and full delivery of Roebling wire rope. Your nearest Roebling office and distributor will help you choose the rope that will perform and stand up best in mining service. And you'll get what you want, when you want it —straight from nearby warehouse stock.

ROEBLING CF&I

Subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J.

BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, N. J.

It's a far cry from freezing weather, but . . .

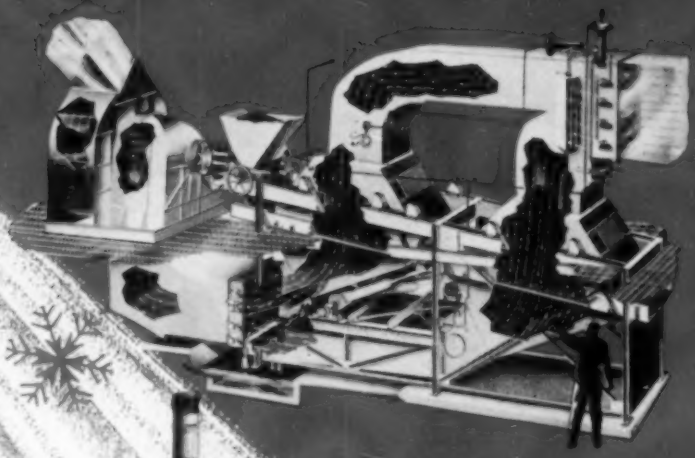
OLD MAN WINTER

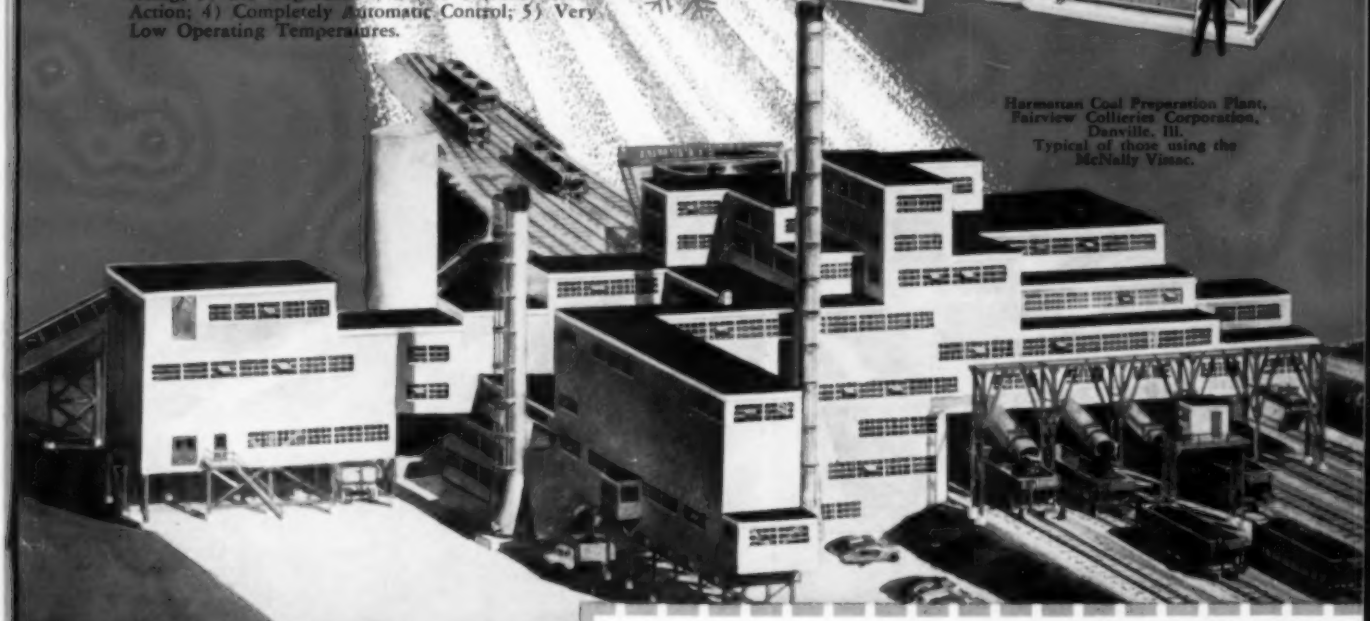
can put the skids under your tonnage!

McNALLY VISSAC THERMAL DRYER

Dries sizes 2" to ½ mm. The induced draft fan draws the hot gases into ducts and down through the screen decks, automatically alternated each second between the two screen sections.

The McNally Vissac Thermal Dryer gives you five built-in advantages: 1) Uniform Drying of Large Tonnages to a Pre-determined Moisture Content; 2) Low Btu Consumption because of Mechanical Dewatering; 3) No Degradation, due to Smooth Screen Action; 4) Completely Automatic Control; 5) Very Low Operating Temperatures.





Harmattan Coal Preparation Plant, Fairview Collieries Corporation, Danville, Ill. Typical of those using the McNally Vissac.

INVESTIGATE NOW
The advantages of drying your coal

Mail this card!

FIRST CLASS
PERMIT No. 93
(Sec. 34.9, P. L. & R.)
PITTSBURG, KANSAS

BUSINESS REPLY CARD
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

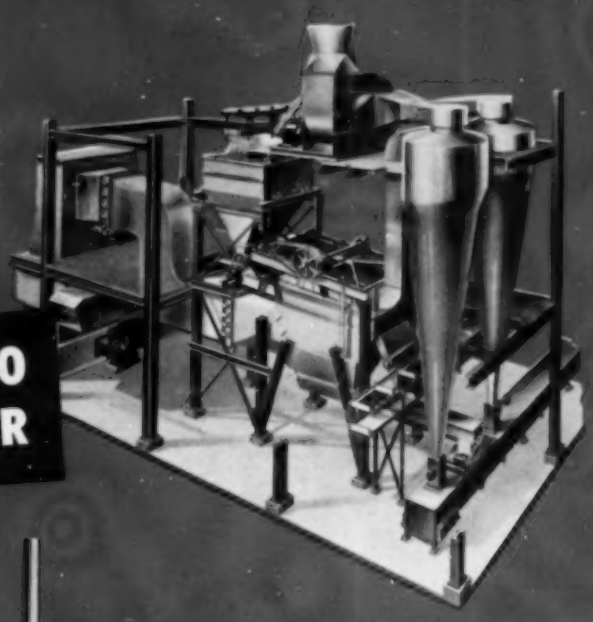
4c-POSTAGE WILL BE PAID BY—
McNally Pittsburg Mfg. Corp.
PITTSBURG, KANSAS

NOW is the time to

plan a dryer addition to your plant

The McNally Pulso is an up-draft type thermal dryer. It solves thermal drying's most difficult problem in the ½" to 0 range. Moisture is evaporated 100% without a drop of effluent. Surface moisture can be controlled to meet your customers' specifications. Dust is trapped 100% . . . no air pollution . . . no coal devaluation due to degradation.

Operating continuously under varying feed and atmospheric conditions, the McNally Pulso is usually equipped with automatic control system, although it may be operated manually if preferred.



McNALLY PULSO THERMAL DRYER

Truax-Traer Coal Company
Preparation Plant, Ceredo, W. Va.
Typical of those using the McNally Pulso.

STATE YOUR PROBLEM HERE OR ON YOUR LETTERHEAD

Send us your recommendations on McNally Heat Drying. We are operating on_____seam. We would like to dry_____x_____ coal at_____tons per hour. Total moisture of washed coal to be dried is_____%. Inherent or seam moisture is_____%. We would like to have_____% total moisture in our dried product.

Our sieve analysis is:

x 1¼"	%	¼" x ⅛"	%
1¼" x ¾"	%	⅛" x 28 Mesh	%
¾" x ½"	%	28 Mesh x 48 Mesh	%
½" x ¼"	%	48 Mesh x 0	%

Name_____Title_____

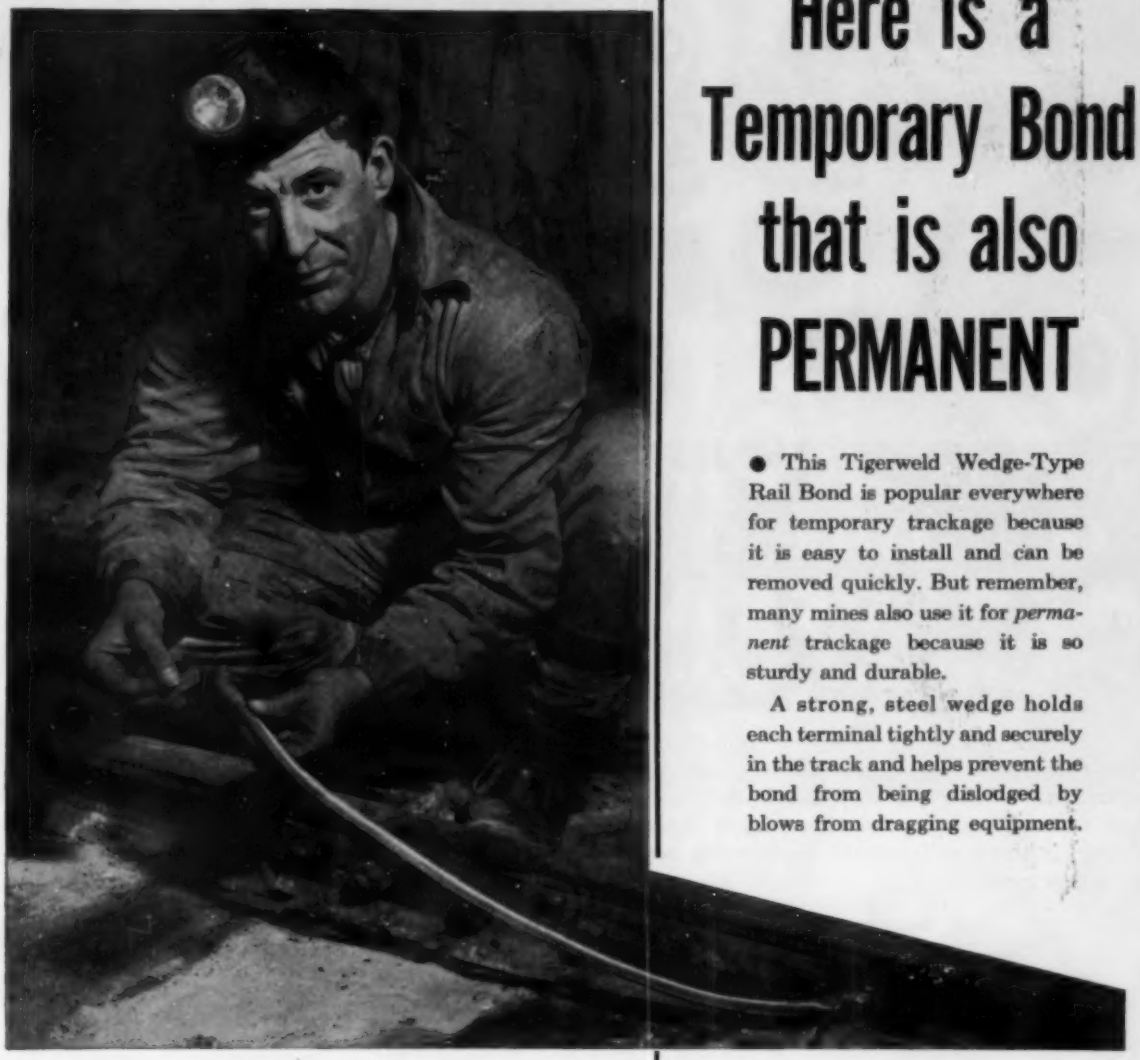
Company_____

City and State_____

( ) Have Sales Engineer call for further consultation.

McNally Pittsburg Manufacturing Corporation—Manufacturing Plants: Pittsburg, Kansas • Wellston, Ohio
Engineering and Sales Offices: Pittsburgh • Chicago • Rio de Janeiro • Pittsburg, Kansas • Wellston, Ohio

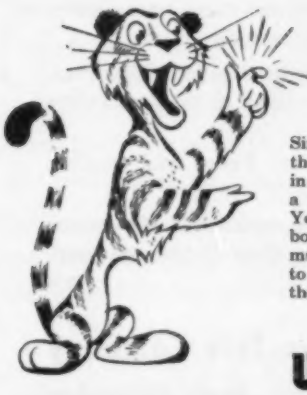
McNALLY PITTSBURG
MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL



Here is a Temporary Bond that is also PERMANENT

● This Tigerweld Wedge-Type Rail Bond is popular everywhere for temporary trackage because it is easy to install and can be removed quickly. But remember, many mines also use it for *permanent* trackage because it is so sturdy and durable.

A strong, steel wedge holds each terminal tightly and securely in the track and helps prevent the bond from being dislodged by blows from dragging equipment.



Installation is a SNAP!

Simply drill a hole in the track. Insert the terminal, then the wedge. Pound in the wedge. Three sharp blows with a 2½ lb. hammer and you're done! You've got a durable, low-resistance bond that is easy to remove if the track must be relocated . . . one that is sure to give dependable, lasting service if the track is permanent.

Write for complete information

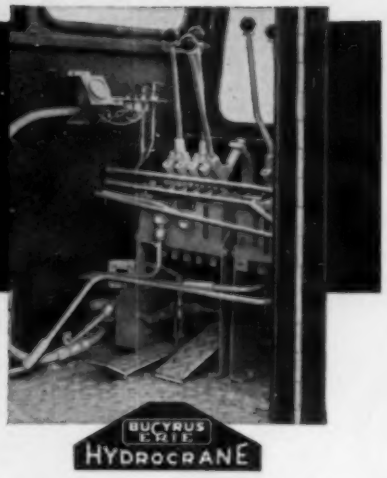
AMERICAN STEEL & WIRE DIVISION
UNITED STATES STEEL CORPORATION
GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

USS Tigerweld Rail Bonds

UNITED STATES STEEL

BUCYRUS-ERIE presents NEW UP-RATED SELF-POWERED HYDROCRANE with selector valve



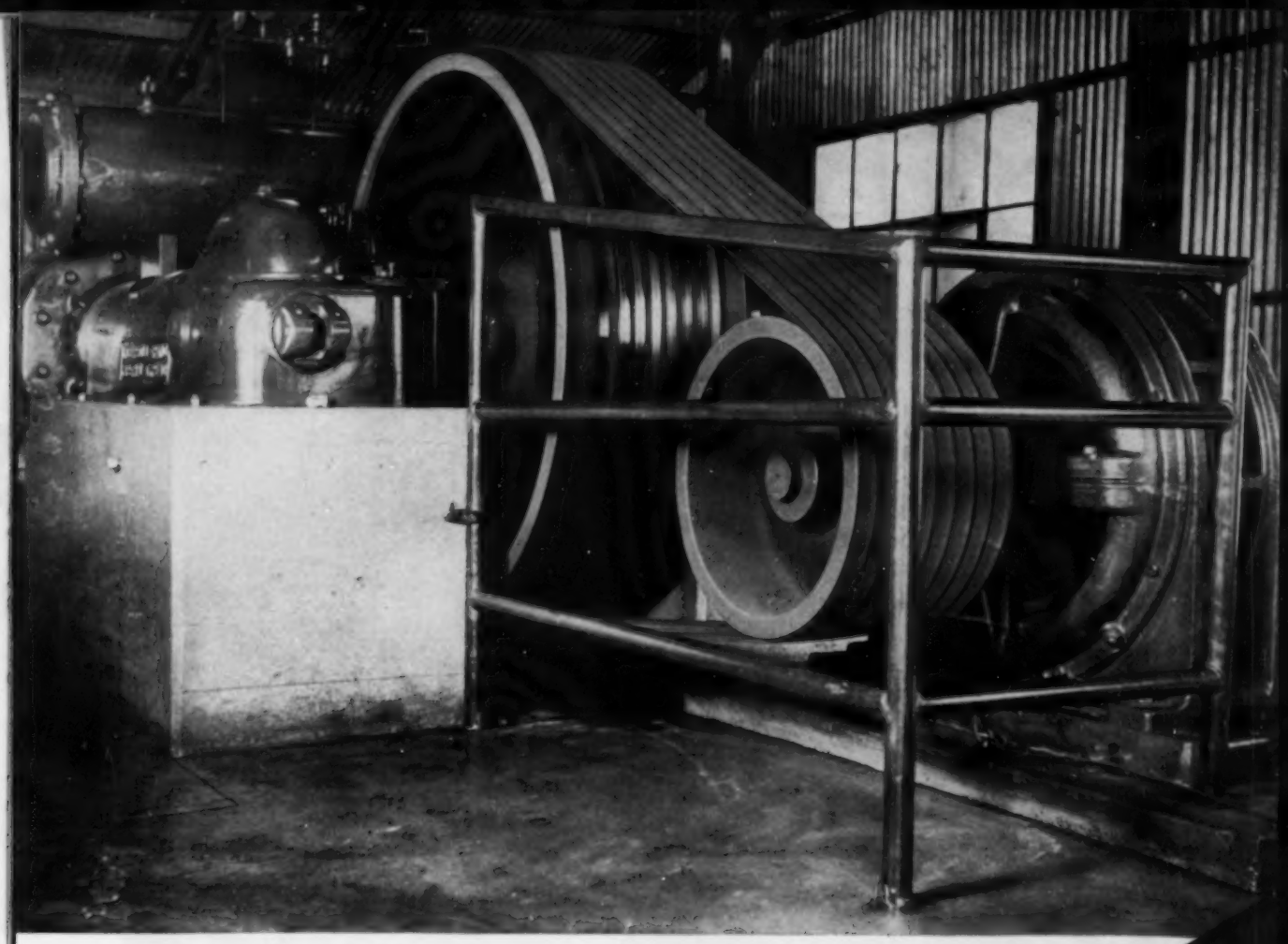
Now Bucyrus-Erie offers a new, more powerful all-hydraulic crane-excavator — the self-powered H-3 Hydrocrane. Taking its power from its own 4-cylinder industrial engine instead of from the truck engine, the new self-powered Hydrocrane provides the following big advantages:

1. **Increased horsepower** through eliminating restrictive influence of side-mounted truck power take-off.
2. **Selector valve operation.** Power concentration selector unit permits channeling hydraulic fluid from all three pumps to one valve bank — increases line speeds up to 50%.
3. **Convenient operation.** Selector valve is foot operated — provides metered control of higher speeds—operator need not let go of hoist and swing levers to operate selector valve. Controls for power plant conveniently grouped at operator's station.
4. **Reduced crane maintenance** from simpler more direct power application. High pressure hoses through center pin leading from pumps to valve bank eliminated. Fewer belts, shafts, and hoses.
5. **Improved efficiency.** Improved oil filtering with less restriction. Better cold weather performance.
6. **Improved truck engine life.** Economy results from fewer truck repair bills. Generator for independent power plant re-charges motor truck battery. Overall fuel consumption is less.

1H54

These are just a few of the advantages of the new self-powered Hydrocrane — and self-power is just one of the big features that is making the Hydrocrane foremost in 1954. See your distributor for complete details.

Bucyrus-Erie Company
South Milwaukee
Wisconsin, U.S.A.



Thermoid Multi-V Belts cut operating costs

Thermoid Industrial Rubber Products — Quality Service

C, D and E Section Belt

There's a Thermoid V-Belt for every mining application. Every belt is *pre-stretched* to provide longer service and maximum power transmission without slippage. Thermoid C, D and E sections are rayon-grommeted for brute strength and extra flexibility that withstands repeated shock loads. The entire belt is vulcanized into a solid unit that resists moisture, abrasion, internal friction and heat.

Get longer wear with less maintenance . . . cut your operating costs with Thermoid Multi-V Belts. Call your Thermoid Distributor or write direct for Catalog #3787.

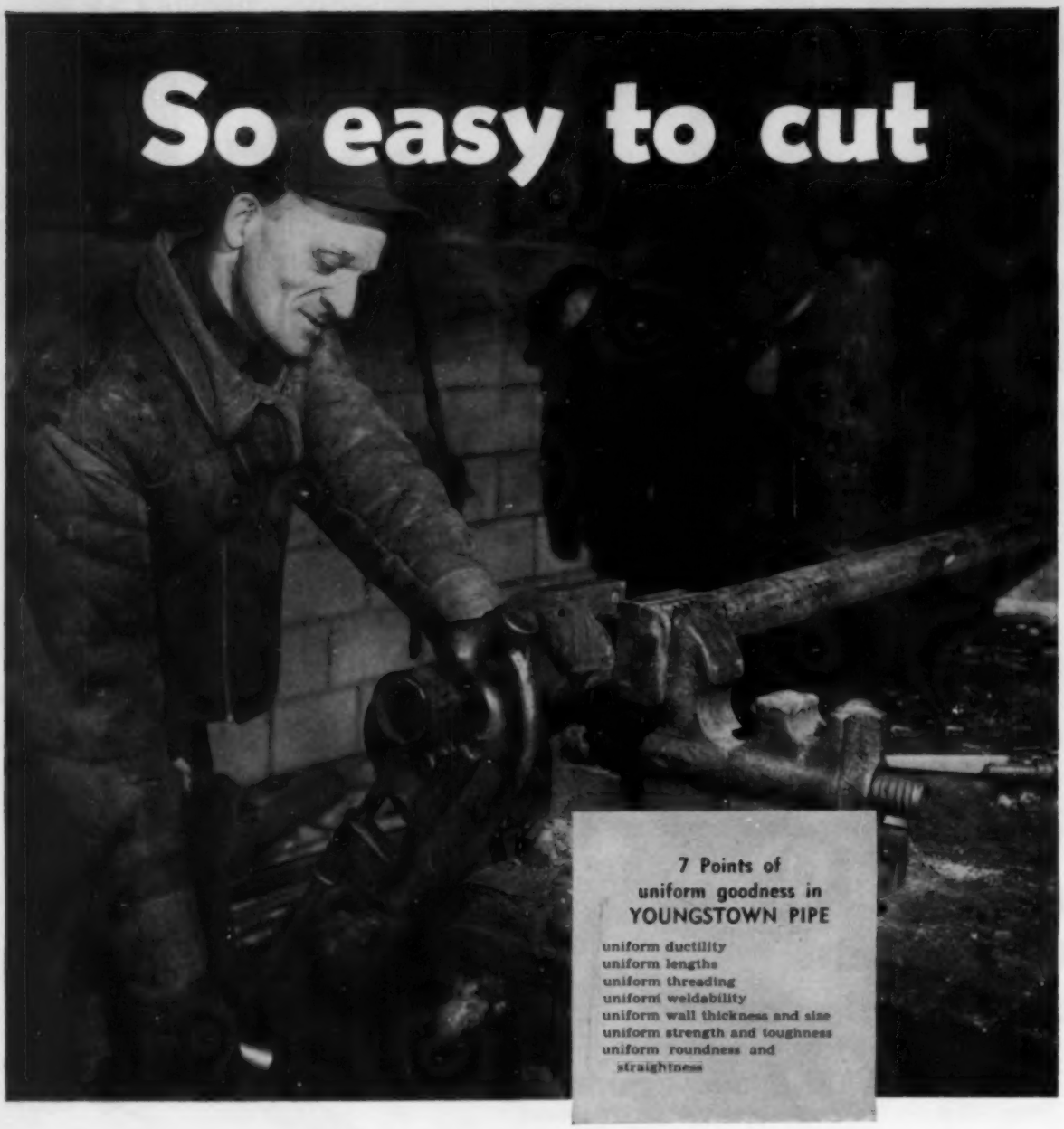
Conveyor & Elevator Belting • Transmission Belting
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

Thermoid

Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

So easy to cut



7 Points of uniform goodness in YOUNGSTOWN PIPE

- uniform ductility
- uniform lengths
- uniform threading
- uniform weldability
- uniform wall thickness and size
- uniform strength and toughness
- uniform roundness and straightness

● Youngstown pipe is plenty tough—but it's not tough to cut. A few turns of the cutter and the job is done—fast, clean, perfect! You save installation time when you work with Youngstown pipe.

Youngstown

QUALITY · YOUNGSTOWN · SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY *Manufacturers of Carbon, Alloy and Yoloy Steel*

General Offices: Youngstown, Ohio - Export Office: 500 Fifth Avenue, New York 36, N. Y.

SHEETS - STRIP - PLATES - STANDARD PIPE - LINE PIPE - OIL COUNTRY TUBULAR GOODS - CONDUIT AND EMT - MECHANICAL TUBING - COLD FINISHED BARS - HOT ROLLED BARS - BAR SHAPES - WIRE - HOT ROLLED RODS - COKE TIN PLATE - ELECTROLYTIC TIN PLATE - RAILROAD TRACK SPIKES

5 cable failures = 1 new cable

If you're tempted to buy shuttle car cable on price alone, remember this statement recently published in a coal mining magazine:

"Only five shuttle car cable failures run up to a cost figure about equal to that of a new cable."

That means, when the shuttle car cable you buy fails five times, it will have cost you the equivalent of a new shuttle car cable.

Common sense dictates that the shuttle car cable to buy is one that gives the longest life while withstanding the roughest treatment. That means Simplex-TIREX Shuttle Car and Mining Machine Cable.

Here's why. Simplex-TIREX Shuttle Car Cable has gear-shaped insulated conductors interlocked to the jacket to keep the conductors from twisting. Only Simplex-TIREX has this exclusive feature. All TIREX Shuttle Car and Mining Machine Cable has the Selenium Neoprene Armor that is *cured in lead* to resist abrasion, flame, oils and snagging.

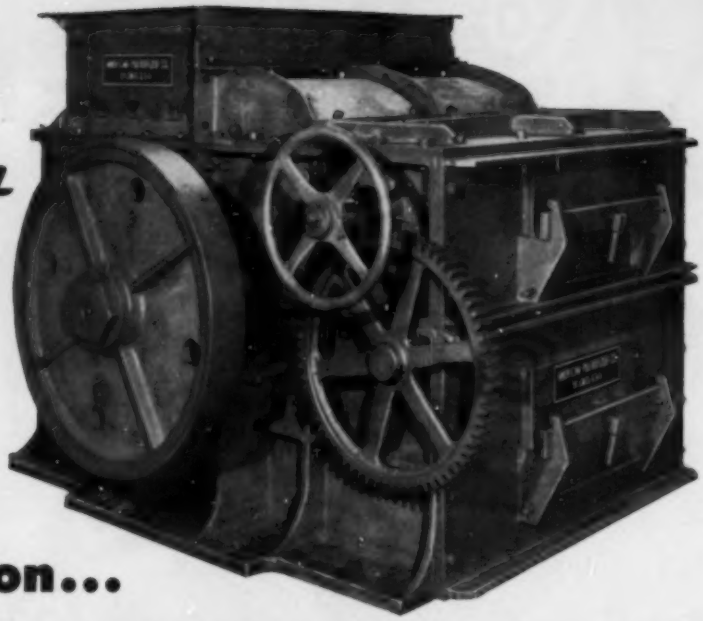
Simplex-TIREX Shuttle Car Cables are designed for extra rugged treatment, long life and to give dependable service indefinitely. You can get them from your local Simplex distributor.

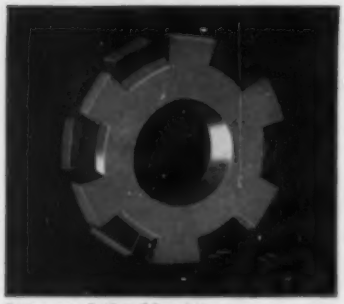
Simplex

TIREX Shuttle Car Cables

SIMPLEX WIRE & CABLE CO., 79 Sidney Street, Cambridge 39, Mass.

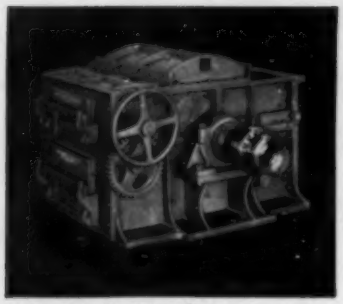
5 reasons why *American Crushers* can reduce coal for less than [image] per ton...





1 Patented Shredder Ring

American-originated feature that splits coal instead of smashing it—for uniform sizing, minimum fines. Result: Americans run at slow speeds, with savings in power and maintenance. No cams, shear pins, toggles.



2 Heavy-Ribbed Steel Frame

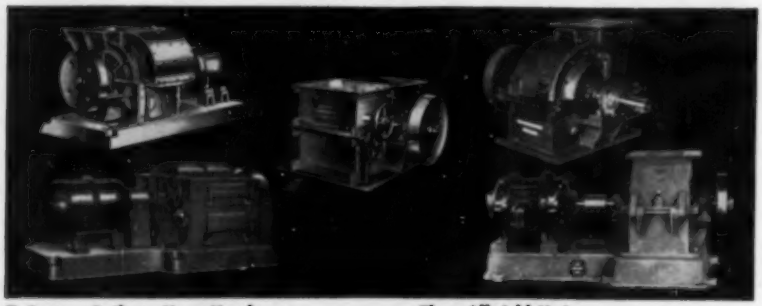
Bearing pedestals are cast integrally with lower side frames. Sectional design for easy dismantling . . . abutting joints accurately machined and bolted together for dust-tight fit.

3 Completely Lined Crushing Chamber

Heavy, renewable liners . . . sectional for easy plate-at-a-time replacement . . . engineered to offer life-time protection to the frame.

4 Complete Accessibility to Adjustment and Parts

All adjustments external—even with crusher in motion. Rotor easily reached by removing top section. Rings readily reversed or replaced. Liners quickly reached, too, for periodical inspection.



5 Custom-Built to Your Needs

American has developed many crusher types, each in a number of sizes. Custom-designed with the proper crushing elements, grate bars or screen plates to produce the desired product in the quantities required.

They All Add Up!

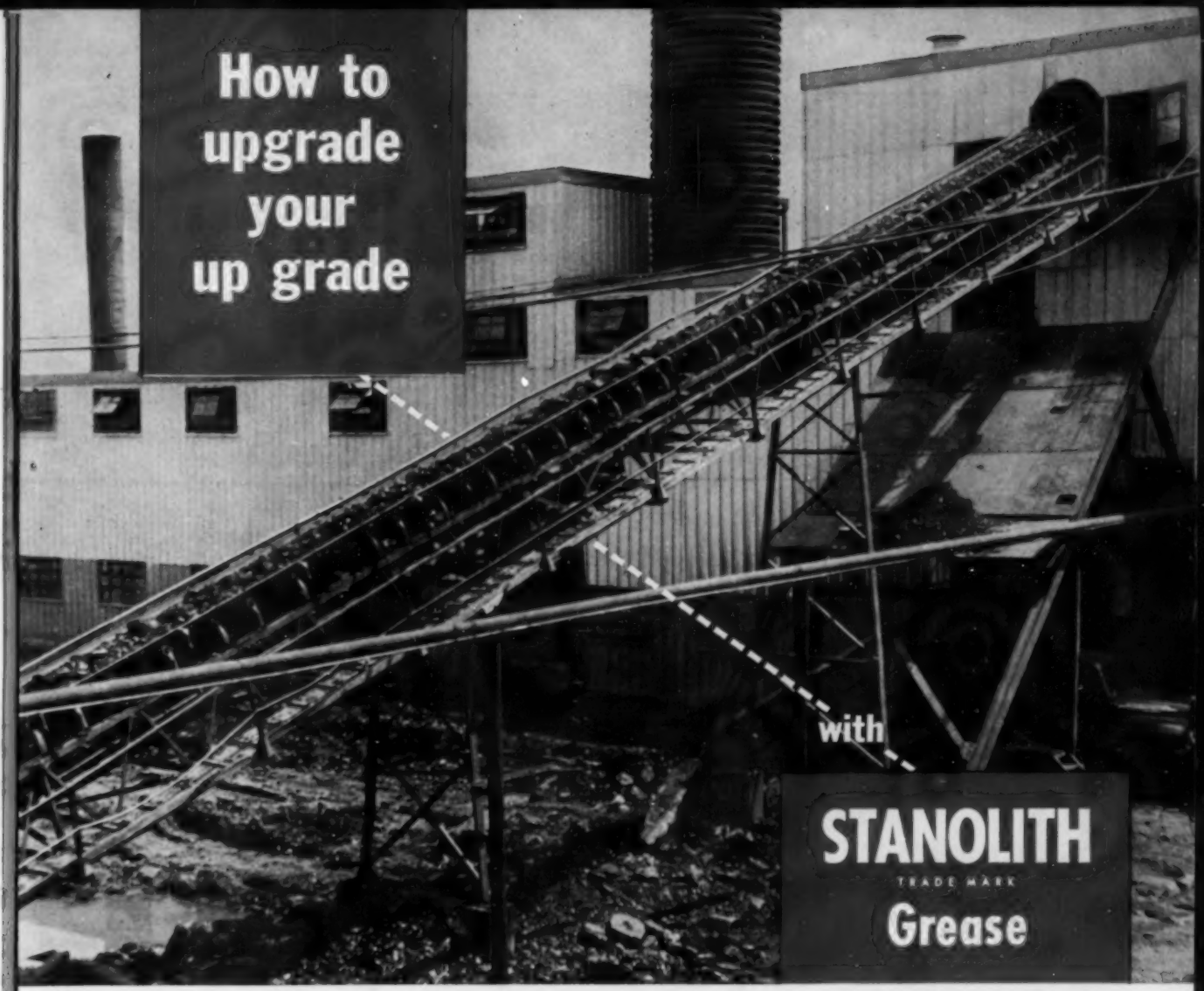
Whenever you figure cost per ton, the best answers come from American. By actual survey, American Crushers, in use an average of ten years, show a parts replacement cost of only 1/10th of 1¢ per ton of coal crushed!

American **PULVERIZER COMPANY**

Coal Crushers up to 800 Tons Per Hour • Laboratory Crushers up to 2,000 Lbs. Per Hour

Originators and Manufacturers of Ring Crushers and Pulverizers

1119 Macklind Ave., St. Louis 10, Mo.



● A midwest coal mine was getting "fed up" on bearing failures on the large conveyor shown here. Dirt and coal dust, both inside and outside the preparation plant, got into the open bearings and mixing with the lubricant formed a "grinding compound." Some greases leaked out of the bearings. Others hardened and caked, making starting difficult and power requirements heavy.

When a Standard lubrication specialist was consulted he recognized the need for a grease that would seal out the dirt and, while resisting excessive thinning, would maintain a soft consistency at all times. He recommended STANOLITH Grease because it has all these desired qualities. In addition it contains an effective oxidation inhibitor which makes it exceptionally long-lasting.

Lubrication with STANOLITH proved so effective on the conveyor bearings that this grease was also put to work on the shaker screens in the preparation plant. The use of only one grease has simplified both stocking and application. Why don't you investigate how STANOLITH Grease can help *you* increase efficiency?

W. M. "Bill" Griswold of Standard Oil's Evansville, Indiana office is the Standard lubrication specialist who worked with this mine to find the right grease for a tough job. You can get the same on-the-job service from the Standard lubrication specialist in your own area. To reach him, phone your nearest Standard Oil Company office. Or write Standard Oil Company (Indiana), 910 S. Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY STANDARD (Indiana)

Dumptor hauls along trestles .

. . or tunnels

without turning

Shuttling back and forth between the loading unit and dump area, Koehring Dumptor travels round-trip without turning. It operates with equal ease in both directions on overhead trestles, in confined underground mines, on open-pit ledges and narrow haul roads. Dumptor gets this unique no-turn advantage through a constant-mesh transmission that gives the same 3-speed travel in either direction.

Every turn eliminated cuts 15 seconds off cycle time. This adds up to a substantial increase in yards hauled per hour. For example, by saving only 2 turns, time studies prove that Dumptor increases hourly yardage output more than 10% on an average 1,000-foot haul.

One-second gravity-dumping also maintains a high rate of production. To dump, operator trips body-release lever, and the 6-yard body instantly tilts 70°. One second later the load is out, and Dumptor is on its way back for the next load. There's no 15 to 25-second wait for slow-acting hydraulic or electric body hoists. What's more, gravity-dump never balks, never wears out.

To learn what these Dumptor advantages can mean in increased production and lower hauling costs on your work, call your Koehring distributor, or write for Dumptor® catalog.

KOEHRING COMPANY

Milwaukee 16, Wisconsin

Subsidiaries: PARSONS • KWIK-MIX • JOHNSON

K440

On trackless mining operation, Koehring 6-yard Dumptor goes underground . . . shuttles in and out of access tunnel without turning. This heavy-duty hauler has over 6 h.p. per ton of loaded weight, climbs 24% ramps, grades.

Dumptor puts stockpiling on a fast, shuttle-haul basis. It drives up to edge of pile, body forward . . . dumps, and heads back for next load without turning. Instant gravity-dump action kicks the load out over edge of the bank . . . saves a lot of dozer clean-up on the stockpile.

Big square body opening permits loading over either end or sides. Dumptor above is teamed with Koehring 1½-yard 605 shovel . . . a big-production combination. Other Koehring excavators: ½ to 2½ yards . . . cranes up to 79½ tons.

"Du Pont 'Monobel' AA gives us higher production efficiency than any other permissible"

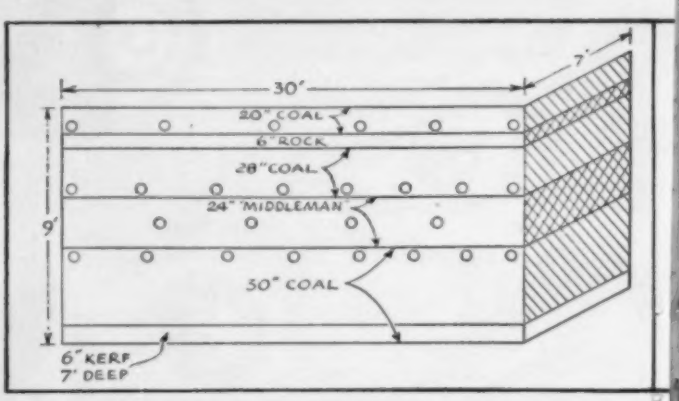
Comments the superintendent of a Central Alabama Coal Mine

"All of our product is used in the By-Product Industry, so coarse coal isn't important," he explained. "However, the Mary Lee Seam, in which our mine is located, contains a six-inch rock band and twenty-four-inch 'middleman,' and both of these must be well broken for our loading machines. That's why we use 'Monobel' AA. This permissible hits hard. It shears the back of the cut and the ribs cleaner and, what is more important, breaks the rock better than any other permissible we have tried."

1. Placing charge of "Monobel" AA in bore hole, drilled just above the twenty-four-inch "middleman." This heavy rock seam must be broken up so that the loading machine can load it out with the coal without delay.

2. Safety supervisor sounding the roof after typical fall of coal made with "Monobel" AA in this mine. Check the results: a well-broken "middleman" which can be easily handled by the loaders.

3. Testing room for gas after loading out the fall of coal. Note how clean the action of Du Pont "Monobel" AA has sheared up the back and the ribs through both the light and heavy rock bands.



4. Shooting pattern was worked out by company representatives and Du Pont technical service men. All rooms are undercut. For maximum safety and economy, the mine uses Du Pont Iron Wire Electric Blasting Caps.

If you're not already using Du Pont "Monobel" AA in your operations, it'll pay you to test it soon. Many mine operators throughout the coal industry have been using it exclusively for years. In their opinion, it's the most effective permissible yet made. For complete information on "Monobel" AA, contact the Du Pont Explosives representative in your district. E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Delaware.

DU PONT
PERMISSIBLES
Blasting Supplies and Accessories

DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

Only Eaton 2-Speed Axles have the money-saving features provided by Planetary Gearing

More than two million
Eaton Axles in trucks today!

With Eaton's exclusive planetary design, gear speeds are slower; gear loads are distributed over several gear teeth, holding down stresses and wear. Planetary pinions turn only in the low speed range. In the high speed range they are locked out. The axle then operates as a conventional single-reduction unit. Eaton 2-Speeds are quiet in operation, easy to shift, and run long, trouble-free mileages. Genuine dollars-and-cents savings for truckers are assured by actual performance records representing billions of miles of operation.

Your truck dealer will be glad to explain how Eaton 2-Speeds will enable your trucks to haul more, faster, and longer, at lower cost.

EATON
2-Speed Truck
AXLES

Axle Division
EATON MANUFACTURING COMPANY
CLEVELAND, OHIO

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

What's YOUR roof-bolting method?

HAMMER DRILLS or . . .

YOU'RE AHEAD Either Way

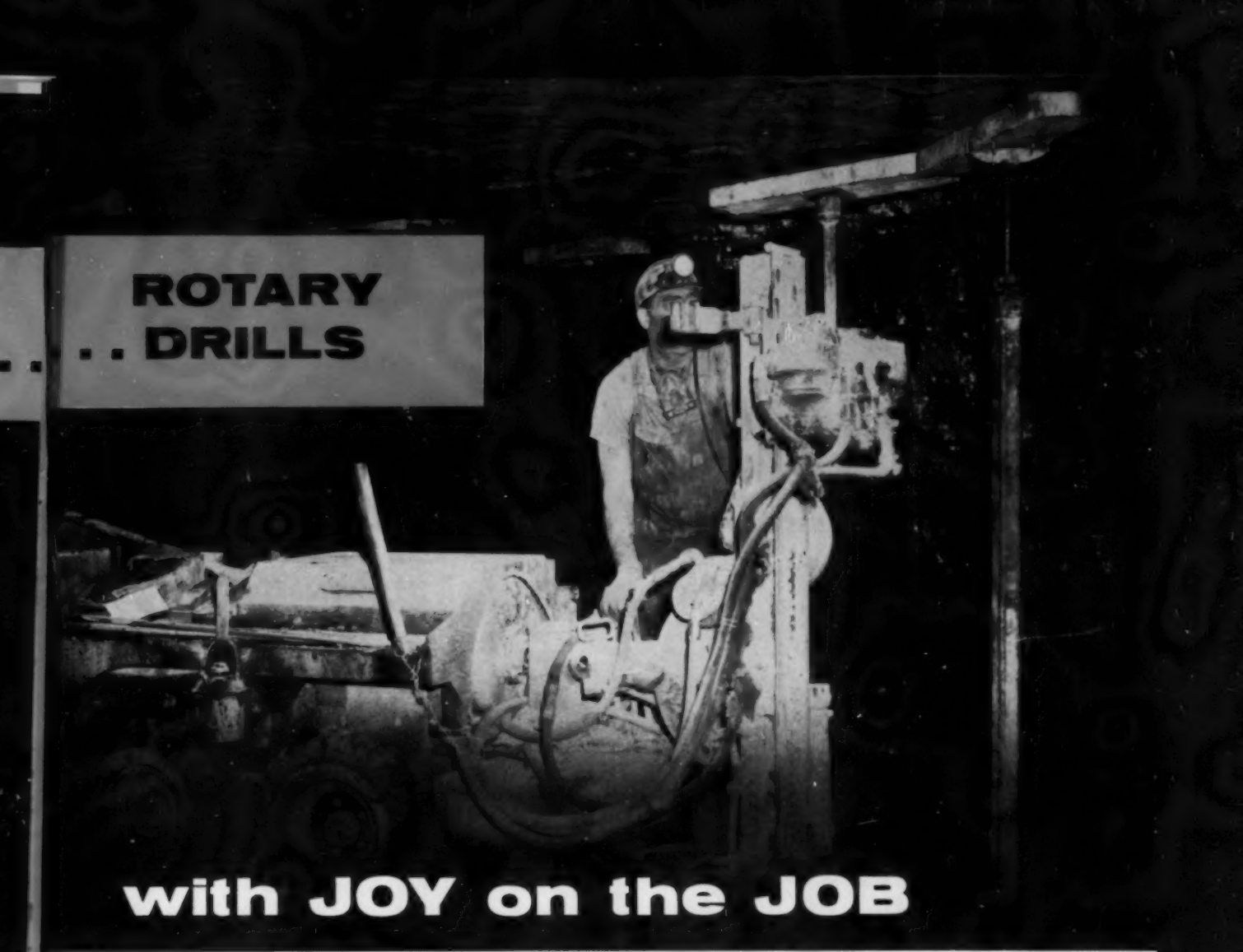
Pneumatic Hammer Drills If you are bolting in hard-structure roof, the Joy SAL-37T Stoper Drill with constant-pressure Telescopic Feed has advantages that no other drill of its type can match. (1) The long steel changes it affords (up to 42") result in *one-third* fewer steel *changes* for your roof-bolters to make; also fewer steel sizes to carry in stock and haul to the face. (2) Air consumption is reduced about 33⅓%, yet (3) at no sacrifice in drilling speed compared to heavier drills using up to 50% more air. (4) Weight is reduced 30%, improving the ease of handling in low or high seams. (5) Maintenance is low; the SAL-37T was developed expressly for heavy duty roof-bolting service—it stays on the job!

Other superior Joy features include: cadmium-plating inside and out for rust-protection and easier run-in; centralized controls with push-button release for easy operation; and independent feed control (no need to crack the throttle to position the drill). Any way you look at it, the Joy SAL-37T means more hole footage per shift in hard roof, drilled in less time and at less cost. ● *Ask for a demonstration—let us prove it.*

JOY SAL-37T Stoper Drill, length 27½", weighs only 72 lbs., uses only 70 cfm of air.

JOY SERVICE...
a Plus Value with Either Drill

Joy sales and service branches and warehouses are conveniently located for immediate availability in every mining area. Joy men are at your side in a matter of hours, when needed, to service your drills—help train your mine personnel to run, maintain and repair the equipment—and help to secure and install Genuine Joy Replacement Parts from nearby stocks, on overnight delivery if necessary. Always use Genuine Joy Parts, made to the original specifications for materials and precision fit.



with JOY on the JOB

Hydraulic Rotary Drill For roof-bolting in softer sandstones, shale or slate, where hydraulic rotary drilling can be employed to advantage, you'll find the Joy RBD-15 away out in front.

Chief features of this self-contained, self-propelled rubber-tired unit are its high maneuverability, great drilling power, and unequalled flexibility in operation. The RBD-15 trams up to 107 fpm, and individually controlled pairs of wheels on each side permit it to turn in its own length, handle as readily in tight places as a crawler-mounted unit, and position holes quickly and accurately.

No other rotary drill is as versatile. With just the touch of centralized hydraulic controls (no time lost; nothing to adjust) the RBD-15 offers an infinitely variable combination of thrust, feed speed, rotation speed and torque to suit variations in the roof structure and the changing needs of the job: from drilling the holes to setting the bolts and tightening the nuts.

Feed thrusts can be varied up to 5400 psi; feed speeds up to 18 fpm, with "run-up" and retraction speeds up to 60 fpm; and there are two rotating speed ranges: a high speed of 700 rpm max., with a max. torque of 115 ft. lbs.—and a low speed of 360 rpm max., with a powerful torque of 240 ft. lbs. max.

Hydraulic boom roll and easy manual drill tilt permit drilling at an angle, also compensate for uneven bottom and assure steel changes without moving the machine. Most holes can be bottomed with only one steel change, or less.

Check with us for the roof-bolting equipment, rotary or pneumatic, that will do the best job under *your* conditions. To determine them accurately, a new service—*Joy Rock-Testing Service*—is at your command. Ask about it. ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

The Joy RBD-15 Hydraulic Rotary Drill, 42" wide, available in two models: 33" and 37" high, with feed frames ranging from 36" to 90" to drill seams from 42" to 96" high.

Consult a Joy Engineer

JOY

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT

W&D CL5274

ROOF BOLTS MAKE YOUR MINE SAFER...MORE PRODUCTIVE

YOUR MINE becomes a safer place in which to work when roof bolts are used. Roof bolts promote safety because they consolidate layers of strata into a single, thick beam. This minimizes the possibility of serious roof falls.

Roof bolting also offers these other important advantages: increased production, wider clearances, greater freedom in operating mechanical equipment, and improved ventilation.

All of these desirable operating conditions can be obtained by using any of these four types of Bethlehem Roof Bolts:

SLOTTED BOLT

This 1-in. bolt has a centered, forged slot. No metal is removed in slotting. Opposite end of bolt has 5 in. of rolled threads. Bolt is for use in 1¼-in. hole. When driven against back of hole, wedge is forced deep into slot, expanding the bolt-end. Bolt has truncated-cone point to prevent damage to threads. Usually furnished with American Standard Regular Square Nut.

SQUARE-HEAD BOLTS

Bethlehem manufactures (1) a square-head ¾-in. carbon-type roof bolt having a minimum breaking load of 20,000 lb, (2) a ⅞-in. high-strength roof bolt having the same minimum breaking load, and (3) a ⅞-in. high-strength roof bolt with a minimum breaking load of 40,000 lb.

These bolts can be furnished with or without ears on the shanks, to accommodate either the Bethlehem 4-leaf Type C expansion shell or the matching-halves Type F expansion shell.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM MINE ROOF BOLTS

BETHLEHEM STEEL

ROCK RATED

before it ever reached the pit!

Look at the development behind the P&H Model 1055 and you see why this 3½-yd. shovel can outproduce machines of greater rated capacity.

It's the one rock shovel built completely from progressive ideas. P&H was first with the added strength of welded steel construction . . . the pioneer in better weight distribution to let you use full digging power at tooth point . . . the leader in cushioned hydraulic control. And it's P&H with revolutionary Magnetorque* that swings you through a faster, smoother cycle in any kind of weather. Count on *15% additional rock production* from this P&H advancement alone!

There's a companion P&H 955A Shovel in the 2½-yd. class equally as outstanding. Write today for further facts about either model.

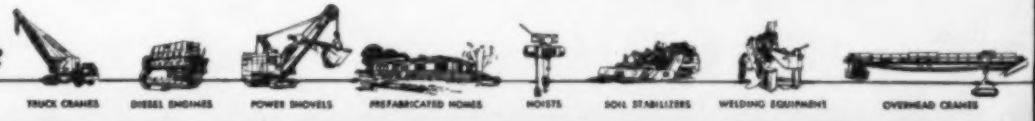
with P&H **MAGNETORQUE*** ELECTRIC SWING

. . . FRICTION FREE
. . . . TROUBLE FREE
Lasts the life of the machine!

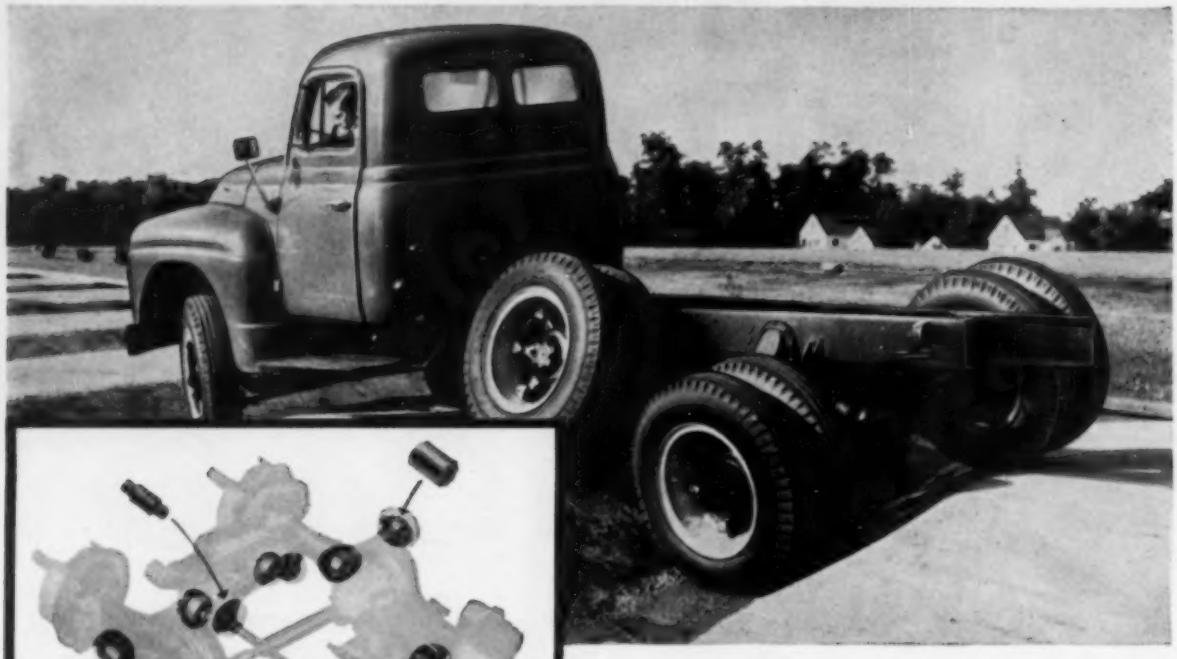
*T.M. of Harnischfeger Corporation for electro-magnetic type coupling.

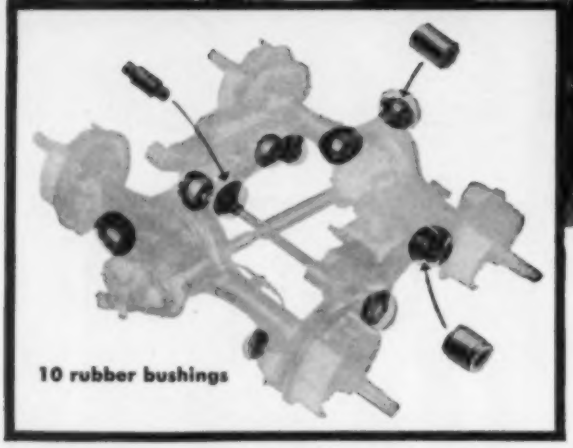
P&H LARGE EXCAVATOR DIVISION
HARNISCHFEGER CORPORATION
MILWAUKEE 46, WISCONSIN

the P&H Line



CHAMPION
of the 6-wheel field





Most advanced bogie in the 6-wheel field—bar none! That's the word for the new INTERNATIONAL bogie, here shown on the famous INTERNATIONAL "twist course." It features (inset) exclusive new straddle-mounted torque arm design. New lubrication-eliminating, shock-reducing rubber bushings. New, easier-serviced, protected air brake cylinder unit. *Only INTERNATIONAL has it. Compare!*

INTERNATIONAL Trucks have been sales leader in the 6-wheel field for 19 straight years . . . because of such extra-efficiency features as the power divider and third differential . . . because of low operating and maintenance costs in both bogie and truck provided by traditional INTERNATIONAL quality and extra-tough, truck-engineered components.

Today, INTERNATIONAL 6-wheel trucks are still champions, with a *new* bogie design that provides unmatched ruggedness—further cuts costs—further lengthens axle and truck life.

INTERNATIONAL and only INTERNATIONAL gives you *all* these advanced bogie features, plus a range of models for every 6-wheel need. See your nearby Dealer or Branch for full facts and the complete INTERNATIONAL money-saving story. Time payments arranged.

INTERNATIONAL HARVESTER COMPANY • CHICAGO

24 SIX-WHEEL MODELS
22,000 to 90,000 Pounds GVW

All heavy-duty engineered, with wheelbases, transmission and axle ratios for every need. Engines from 130 to 356 h.p. Choice of gasoline or LPG power. Diesel engines available in models with GVW ratings of 30,000 lbs. and over. A part of America's most complete truck line—175 basic models, from ½-ton pickups to 90,000 lbs. GVW off-highway models.

International Harvester Builds **McCORMICK®** Farm Equipment and **FARMALL®** Tractors . . . Motor Trucks . . . Industrial Power . . . Refrigerators and Freezers

Better roads mean a better America

INTERNATIONAL® TRUCKS
"Standard of the Highway"

here's how one TSP sprocket has saved $5,222.00

THE VALLEY CAMP COAL COMPANY, Maidsville, West Virginia installed a "Tool Steel Process" drive sprocket on the coal tipple car elevator in August, 1950. It's still in service!

A competitive sprocket (costing the same amount as the TSP sprocket) previously used in the same service lasted *only three months!*

The Valley Camp Coal Company's tipple foreman states: "Based on present rate of wear, our TSP sprocket should have a service life of *at least 10 years.*" Estimating sprocket cost plus a periodical labor charge for replacement of the competitive product, this one TSP sprocket installation has already saved 18 times its cost and has saved this company a total of $5,222.00 so far -- and savings are still piling up!

TSP SPROCKETS are hardened by our special process. The file hard surface to the full depth of permissible wear gives maximum life. In addition, the TSP smooth surface reduces wear on chains. The core, refined for toughness and ductility, gives maximum strength. You receive an absolutely positive written guarantee that TSP products will give a longer life in the same service than any other product.

Our comprehensive Bulletin No. 1153 shows many applications for TSP products in the Mining Industry. Write today.

THE TOOL STEEL GEAR AND PINION CO.
CINCINNATI 16, OHIO, U. S. A.

AD 159

The World's Standard of Quality Since 1909 for Gears • Pinions • Rolls • Wheels and Other Hardened Products

At Panther Coal Company . . .

Belt reinforced with "Cordura" rayon troughs better . . . has minimum stretch

Reinforced with Du Pont "Cordura," this belt operates at 275 feet per minute. Driven by a 25-horsepower motor, it carries some 107 tons per hour. During its operation it has never been necessary to stop it for taking up or other repairs.

According to engineers at Panther Coal Company's Marybill, West Virginia, mine, the 30" slope belt pictured above trains perfectly and has not stretched enough to be noticeable. It was manufactured by Goodyear Tire & Rubber Company on a 4-ply carcass of Du Pont Cordura* High Tenacity Rayon.

Here's the simple reason why belts reinforced with "Cordura" train better under all operating conditions. Man-made "Cordura" rayon yarn is inherently stronger than yarn of natural fibers. This permits a thinner . . . yet stronger . . . belt, with fewer plies. *Greater strength with less bulk.* These thinner belts are naturally more flexible, sit more snugly on the center idler—and thus have better troughability.

Also "Cordura" has the added advantage of making the belt relatively stretch-free. Find out about belts reinforced with Du Pont "Cordura." We'll be glad to send you the names of suppliers . . . together with full information about "Cordura" rayon. Just write for your FREE copy of the booklet "Mine & Quarry Facts" about "Cordura" to: Textile Fibers Dept., Room 11504C, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

*REG. U.S. PAT. OFF.

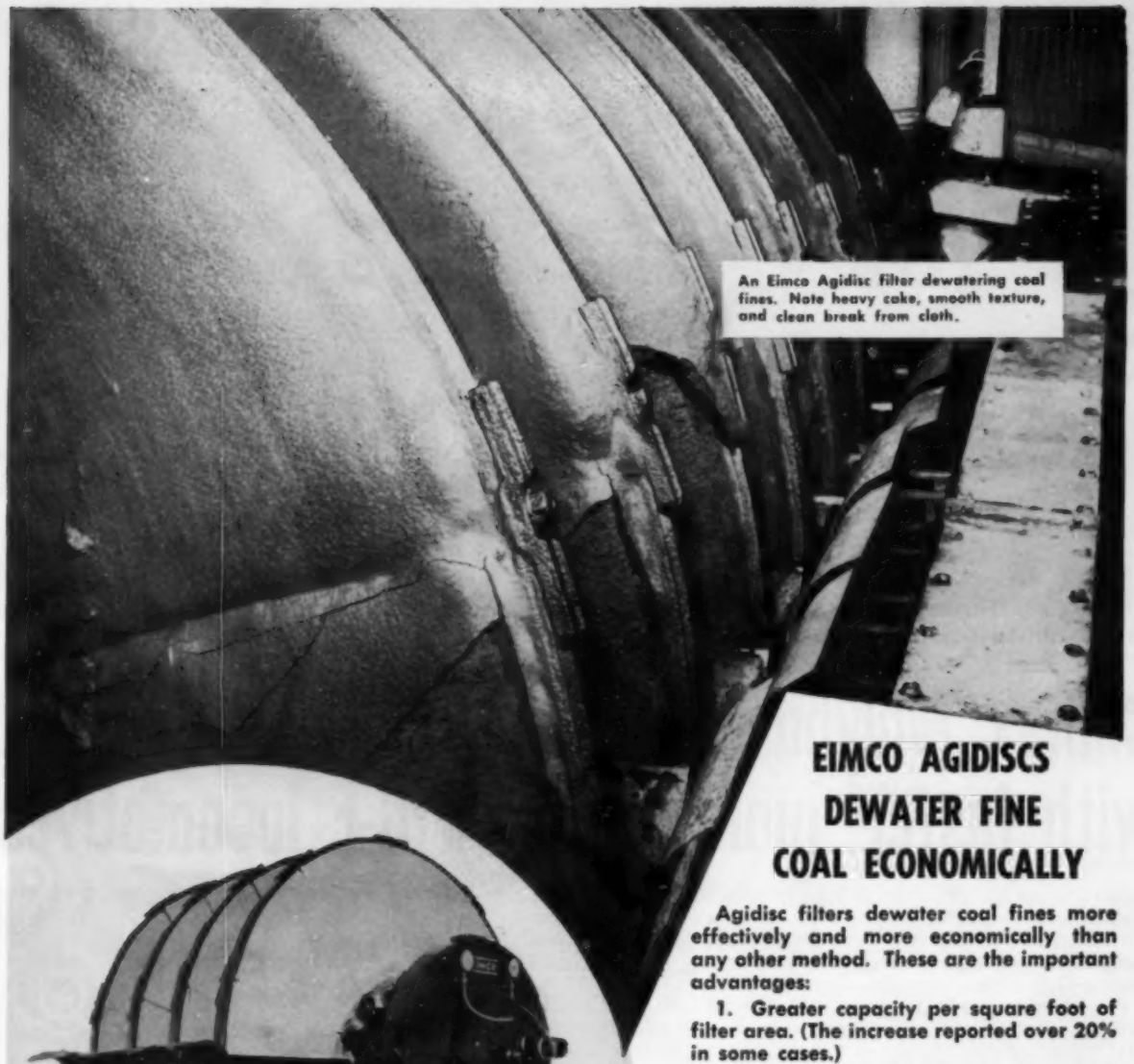
Du Pont "*Cordura*" High Tenacity Rayon

STRENGTH AT LOW COST

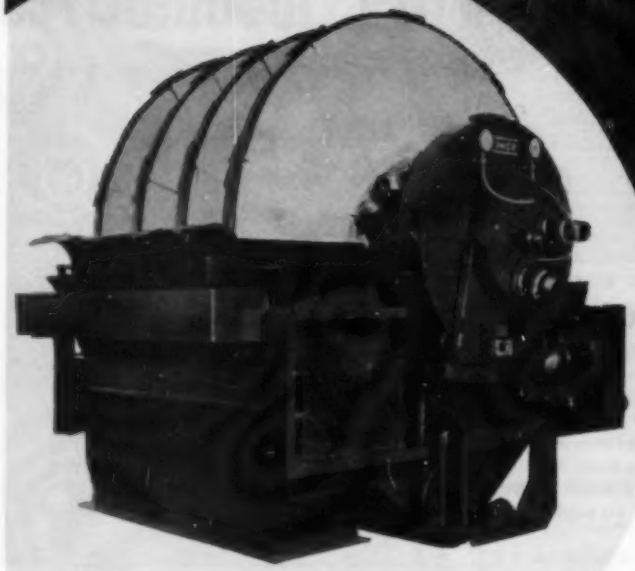
DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*



An Eimco Agidisc filter dewatering coal fines. Note heavy cake, smooth texture, and clean break from cloth.



An Eimco 8' diam. x 4 disc Agidisc type filter — one of many popular sizes in coal washing plants.

EIMCO AGIDISCS DEWATER FINE COAL ECONOMICALLY

Agidisc filters dewater coal fines more effectively and more economically than any other method. These are the important advantages:

1. Greater capacity per square foot of filter area. (The increase reported over 20% in some cases.)

2. Even distribution of cake over entire surface of disc sector for uniform drying of cake.

3. Lower moisture content in cake which results in many cases in the elimination of auxiliary equipment to drive off moisture from the coal fines.

4. Greater life in fliter media; resulting in an additional savings — and many other advantages.

Investigate Eimco filters for dewatering coal fines. Our Research Development Department is prepared to offer you competent trained engineering assistance on dewatering problems. Let us tell you more about this important Eimco service.

THE EIMCO CORPORATION

Salt Lake City, Utah—U.S.A. • Export Offices: Eimco Bldg., 52 South St., New York City

New York, N. Y. Chicago, Ill. San Francisco, Calif. El Paso, Texas Birmingham, Ala. Duluth, Minn. Kellogg, Ida. London, Eng. Paris, France Milan, Italy

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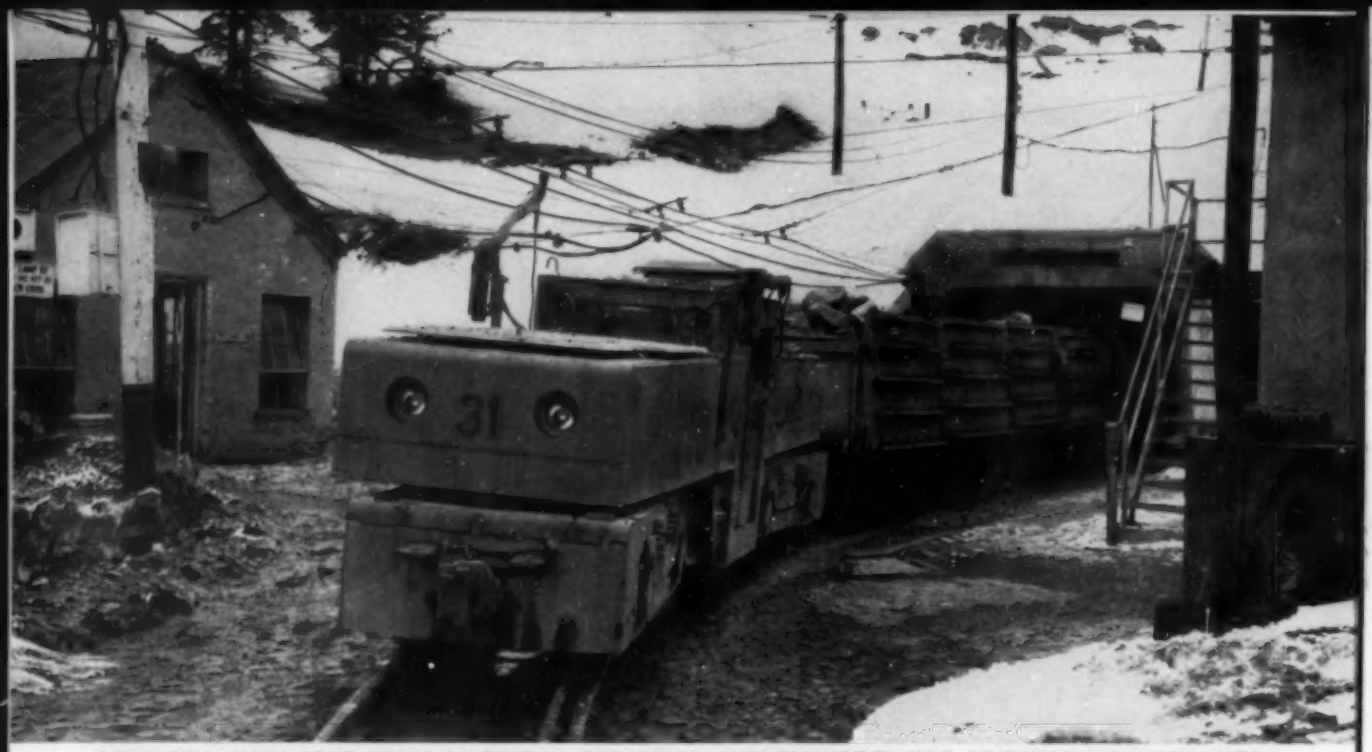


G-E 20-TON LOCOMOTIVE HAULS 24 TEN-TON CARS FROM PHILLIPSON LEVEL MINE AT CLIMAX MOLYBDENUM CO.

Climax Molybdenum hauls 20% more load with faster, more powerful G-E locomotives

When Climax Molybdenum Company decided to replace some high-maintenance haulage locomotives at its mine in Climax, Colorado, it purchased two 20-ton four-axle, swivel-truck G-E locomotives. The company based its choice on the outstanding performance of the smaller G-E locomotives already in use at the mine.

Placed in service in January, 1953, the two new G-E locomotives have enabled Climax to increase efficiency. Each locomotive can haul four more cars per trip—a twenty percent increase in load. Also, higher speeds possible with these G-E locomotives mean more round trips per day. The result is higher production at the mill.

FINE PERFORMANCE IN EXTREME CLIMATE

The center cab design of the new locomotives increases operator safety. G-E heaters keep operators comfortable—even when winter temperatures drop to a wind-swept 30 below in the thin air at 11,500 feet.

Maintenance costs on these haulage locomotives have been low, despite the bitter climate in which they work and the heavy loads imposed on them. The fine performance of the new locomotives played an important part in Climax's decision to order an additional five similar units, which have recently been delivered.

One of the several types of mine locomotives G.E. manufactures is probably right for your haulage requirements. You can get more information through your nearest G-E Apparatus Sales Office. Or, write to: *General Electric Co., Section 120-68, Schenectady 5, N. Y.*

OPERATORS LIKE THE SAFER, HEATED CENTER CAB

You can put your confidence in—

GENERAL ELECTRIC

THIS INSTALLATION is located at the Jamison Coal & Coke Co. Mine 21, Hostetter, Pennsylvania. Photograph retouched to show interior construction.

STOP BREAKAGE LOSSES with HOLMES *LOWERING SPIRALS*

- **No Droppage to degrade your coal**
- **No wear and tear on bins**
- **Costs nothing to operate**

Robert Holmes Lowering Spirals are designed to lower material through the use of centrifugal force, thus eliminating the need of an inside retaining lip. Each spiral is formed like a well-banked race track. The coal automatically slows down when it reaches the "safe" speed limit, regardless of the distance of travel.

As there is no retaining lip, the coal slides gently off onto the peak of the pile to form a natural angle of repose. In this way, the coal is spread out uniformly . . . a real advantage where segregation is a problem.

Lowering spirals are essential to proper handling in surge bins, run-of-mine storage bins and pockets, mine retail sales bins, and consumer storage systems.

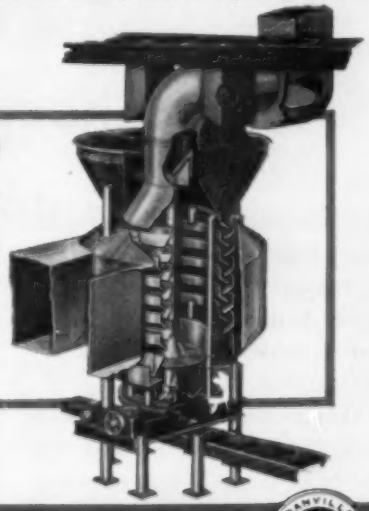
For Free Literature and Complete Details, Write Dept. A-33

DRY UP TO 60 TONS PER HOUR IN ONE PASS!

Baughman VERTI-VANE THERMAL COAL DRYER

Both low in initial cost and operating cost . . . each Verti-Vane unit is designed for capacities from 15 to 60 tons. It handles all coal sizes from 1½" down. Reduces surface moisture to approximately 2% in a "one-pass" operation. Minimum of moving parts and slow-speed operation tend to eliminate shift breakdowns and lost time. Easily adjusted for feed conditions . . . requires little attention.

Write for Free Catalog No. 101 Today. Please address Dept. A-33.



Bigger tonnages per day through continuous one-pass coal drying.

ROBERT HOLMES and BROS, INC.
DANVILLE ILLINOIS

Manufacturers of: **SHEAVES, TIPPLE EQUIPMENT, CAGES, SKIPS, LOWERING SPIRALS, CAR PULLERS AND RETARDERS, DRYERS, LABORATORY CRUSHERS, HOISTS, VIBRATING SCREENS, DUSTOLATORS**

How to keep a frog from loosening up

See these simple plates with the sturdy forged hooks? Their job is to support a frog and keep it rigidly in line. And you will never find a more effective device for this purpose.

They are Bethlehem Twin Hook Frog Plates, and they are strong, low in cost, and so easy to install. As you will note, each plate has a hook at one end. The plates are always used in pairs. This means they can be used at all tie positions; no need for a large and confusing variety of lengths.

Because the hooks are big, they can take the most severe side thrust. Install them as shown above, two to a tie, using track spikes. Then you'll have a well-supported frog that will stay in alignment, with plenty of bearing surface to prevent mechanical wear of the tie.

These plates will save their cost in reduced maintenance, through prolonging frog and tie life. Write or phone the nearest Bethlehem sales office for more details.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM TWIN HOOK FROG PLATES

ANOTHER

FAIRMONT

PREPARATION PLANT

FAIRMONT-BUILT PLANT AT MATHIES COAL COMPANY AT MONONGAHELA, PA. CAPACITY APPROXIMATELY 1000 TONS PER HOUR.

Something Extra

PARTIAL VIEW OF TWENTY-SIX DEISTER SUPER DUTY DIAGONAL DECK NO. 7 COAL WASHING TABLES USED IN ABOVE INSTALLATION FOR CLEANING 5/16" x 0 SIZE. NOT SHOWN ARE TWO 13'-6" DIAMETER CHANCE CONES FOR CLEANING 8" X 5/16" SIZE.

...in cleaning coal for by-product purposes

When coal must meet the exacting requirements of by-product purposes, Fairmont-built plants are designed to guarantee a day to day uniformity in ash and sulphur content.

Through coordinated responsibility in design, engineering, fabrication and erection, Fairmont plants result in "something extra" toward greater operating economy and production efficiency.

When you have a cleaning problem, let Fairmont assume the full responsibility of designing, building or modernizing a plant that guarantees product uniformity and over 99% separating efficiency through a wide size range in any tonnage capacity. CALL A FAIRMONT ENGINEER!

FAIRMONT MACHINERY COMPANY

FAIRMONT, WEST VIRGINIA

DESIGNERS AND CONSTRUCTORS OF COMPLETE COAL PREPARATION PLANTS USING BOTH WET AND DRY CLEANING, CENTRIFUGAL AND THERMAL DRYING.

SMOOTHS WINTER OUT OF HAUL ROADS AT ⅓ THE COST OF LARGE GRADERS

Haul roads take a real beating—especially during the winter months. Frost boils, ruts, excessive breakup — all need urgent attention before roads can efficiently handle spring's increasing traffic.

The Allis-Chalmers Model D is tailor-made for haul road maintenance . . . yet with all its capacity to do outstanding work on large or small jobs, this versatile machine costs only one-third as much as a larger grader.

With powerful 50 brake hp. engine backed by sure-footed tandem, the Model D with ROLL-AWAY moldboard blades faster, smoother and easier — on grading and leveling, ditching and sloping, and other maintenance jobs. Its compact design allows it to keep working when trucks pass — no need to pull off the road.

For handling a variety of year-round jobs, the Model D has easily mounted attachments — hydraulic rear-end loader, scarifier, snowplow and windrow eliminator. In addition, power circle turn and leaning front wheel are also available as optional equipment.

The full story and a demonstration of the versatile Model D awaits you at your Allis-Chalmers dealer. See him soon.

Weight — 8,800 lb. (bare)
Brake hp. — 50
Speeds — four forward to 25.6 mph, reverse to 3.3 mph.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

ROLL-AWAY is an Allis-Chalmers trademark.

COME SEE...

how Pittsburgh Purple Armored Gears are made

● That little old plant of ours at 27th and Smallman got too small for us so we went "house" hunting. Pictured above is what we found—33,000 feet of floor space with five acres of room for us to spread out. Now we'll be able to give you better service.

● New and better equipment, in addition to equipment from our old plant, is beginning to turn out Pittsburgh Purple Armored Products faster than ever. And our new, enlarged heat-treating facilities will enable us to continue to supply the high quality ARMORED and heat-treated gears ...and allied products...which have been guaranteed by Pittsburgh Gear and accepted throughout the industry as second to none...since 1914.

Come and see us when you can. Meanwhile, send us your specifications for quotation; or tell us what you need, and we'll design the gears for you. Our engineering department is at your service.

SPUR	MINING MACHINE
MITRE	GEARS
HELICAL	and
HERRINGBONE	PARTS
WORM GEARS	for
REDUCERS	LOADERS
CRANE WHEELS	CUTTERS
	LOCOMOTIVES

PITTSBURGH GEAR COMPANY

Neville Island
Pittsburgh 25, Pa.
Phone: SPaulding 1-4600

subsidiary of BRAD FOOTE GEAR WORKS, INC. • CICERO 50, ILLINOIS

GUARANTEED PITTSBURGH
ARMORED PRODUCTS
Reg. U. S. Pat. Off.

PROBLEM: CABLE FAILURE...

new cable needed • downtime • idle machinery • repair expenses • lost tonnage

Check these service advantages before you buy another foot of mining cable

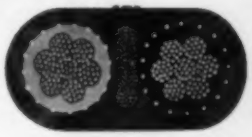
Any mine cable will fail, eventually. But here's how you can minimize the trouble cable failures cause you.

You can buy the best. And you can buy the best for *less* when you count its cost in terms of less cable replacement, less lost production, less repair crew expense and less general inconvenience.

How can you tell the best? A check of this list of quality cable features can help you answer the question—and save you money. It's a list of advantages of Rome 60 parallel duplex shuttle car cable.

1. FLEXIBLE—Tough Neoprene webbing separates grounding conductor from insulated conductors. This gives you . . . high impact resistance, low conductor fatigue, better protection against "shorts" and maximum flexibility.

2. INTERLOCKED CONSTRUCTION—This cross section shows what interlocked construction is . . . the open braid around each conductor locks the conductor to the Neoprene sheath. This interlocked construction prevents separation of conductors from sheath by twisting, pulling and flexing.

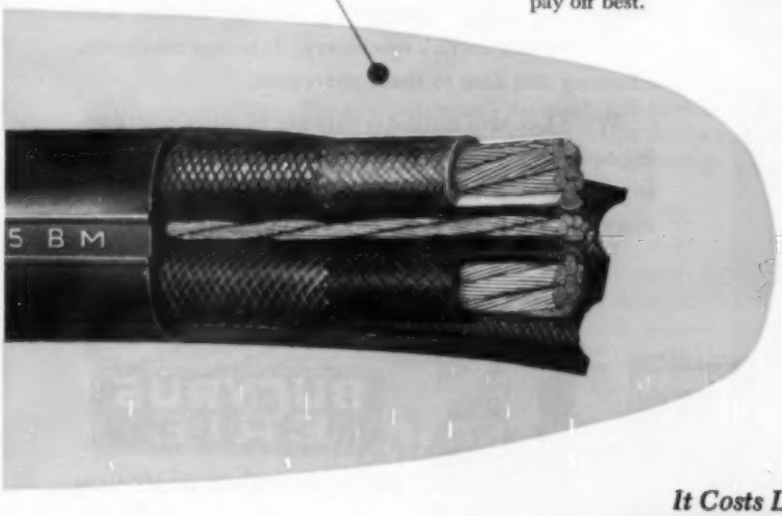


3. OVERLOAD PROTECTION—The insulation is compounded for heat resistance to permit continuous operation at 75°C. (167° F.) and adequately protects against deterioration at high overloads often experienced.

4. THE NEOPRENE SHEATH—Tire-like toughness given by the molded-in-lead Neoprene sheath protects your cable against impact, acids, oils, abrasion and flame.

5. MEETS CODES—The Neoprene sheath, marked P-105 BM, conforms to State of Pennsylvania and Bureau of Mines Safety Codes. When you invest in Rome 60, you make your total investment in men and machinery pay off best.

HERE'S HELP



QUALITY FOR YOU...

engineered and built into Rome 60 Types W and G parallel duplex and . . .

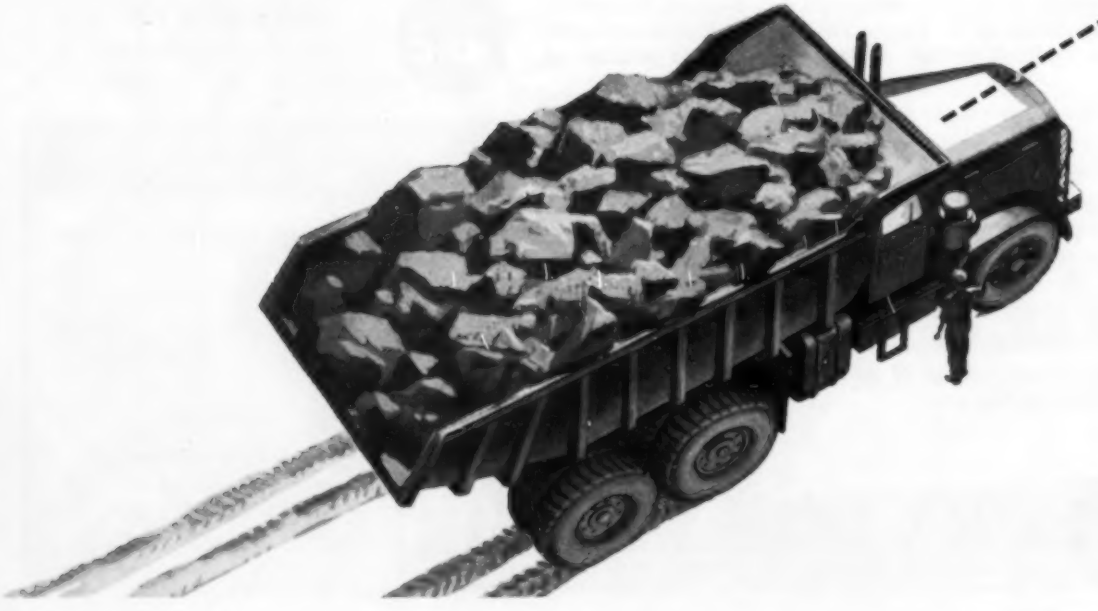
- Multiple-conductor power cables—Types W and G
- Type SO portable cords
- Single-conductor locomotive cable
- Mine power distribution cables
- Shovel and dredge cables
- Shot firing cord

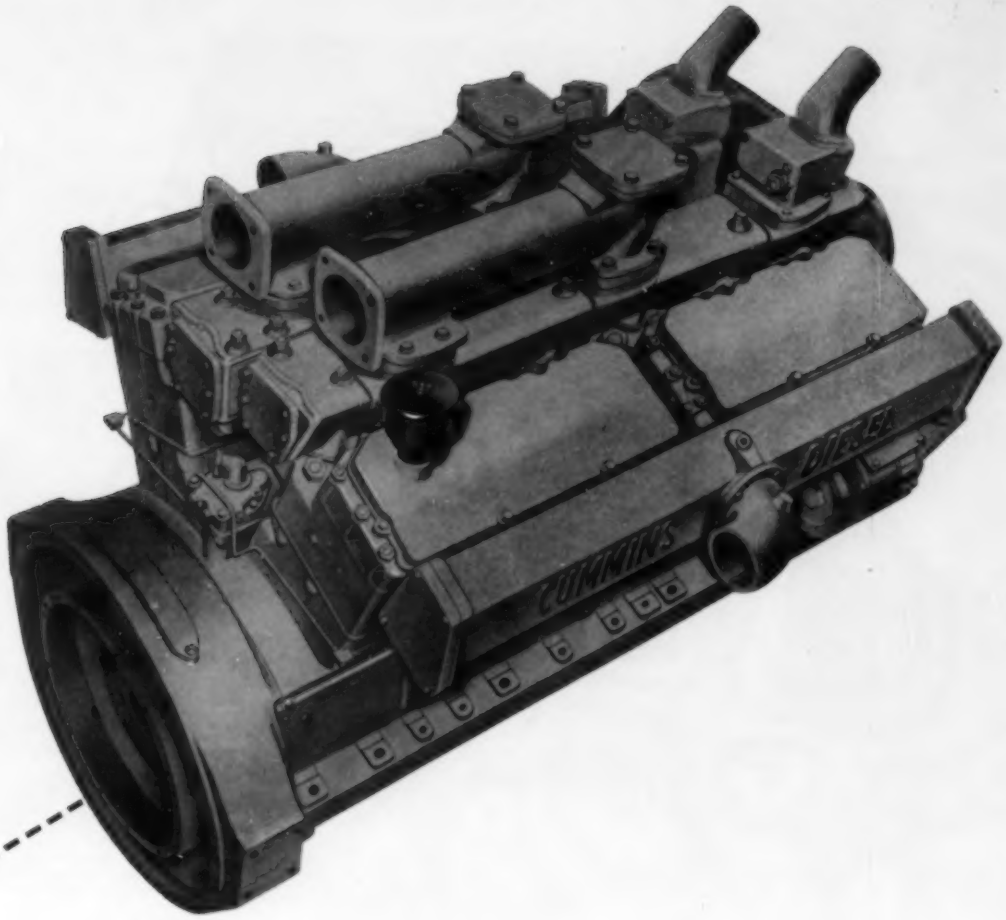
It Costs Less to Buy the Best

ROME CABLE Corporation
ROME • NEW YORK
TORRANCE • CALIFORNIA

The Cummins answer to the trend toward bigger and faster equipment

A powerful, lightweight diesel that



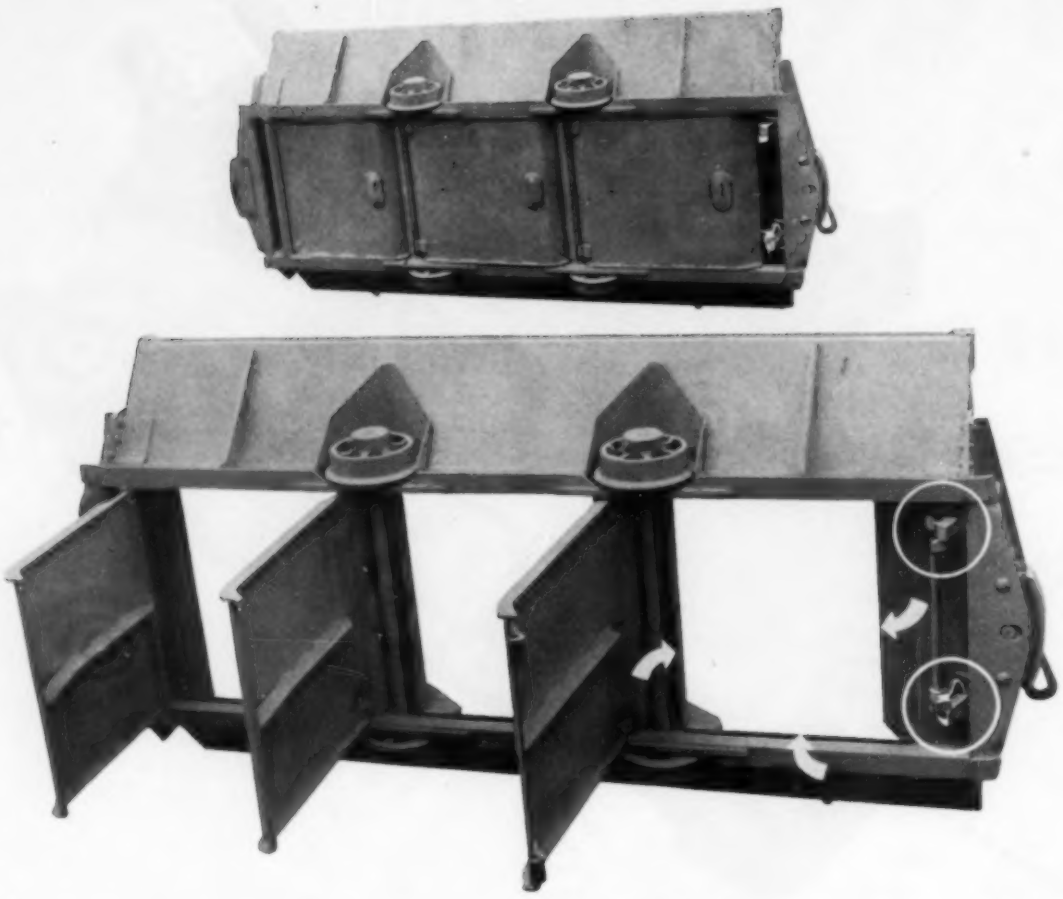


moves more payload per shift

Cummins modern 12 cylinder V-type diesels anticipate needs of the future. They include the 400 h.p. NVH-1200, the 550 h.p. NVHS-1200, and the 600 h.p. turbocharged VT-12. Powering trucks, shovels, locomotives, and other heavy-duty equipment, these rugged units get more done per shift by handling bigger loads faster, at less cost. You can get specifications by calling your Cummins dealer or equipment representative.

CUMMINS **Cummins** Engine Company, Inc. • Columbus, Indiana

Leader in rugged, lightweight, high-speed diesels (60-600 h.p.)



Only S-D Automatics have "Twin Safety Latches" . . .

. . . two latches for safe and sure latching that are tripped simultaneously underneath car for automatic dumping

WITH S-D "TWIN SAFETY LATCHES" your bottom dumping car doors are actually padlocked twice. These latches (see circles in large photo above) are tripped independently by a pair of tripping devices mounted between the rails. Both latches must be tripped simultaneously before the doors open. This eliminates doors opening accidently anywhere along the haulage route. (Small photo at top shows bottom view of an S-D Automatic with doors closed).

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Coal Age

JULY, 1954

IVAN A. GIVEN, EDITOR

On the Record

POINTING OUT that good can come from adversity smacks somewhat of cold comfort in a period when business is down, prices are feeling the pressure and maintenance of a reasonable degree of company and industry prosperity becomes a real struggle. But difficulties stimulate thinking and action, and that action can measurably benefit the industry and its individual companies now and in the future. In fact, adversity can stimulate action outside ownership and managerial ranks—and even outside the industry—for example, the action of the union in bringing pressure to remove restrictions on output per man in the anthracite industry, and the action of a substantial group of state governors in organizing to provide concrete help and backing in the solution of certain industry problems.

It might be said, in fact, that in the drive to make coal a better industry, adversity has brought coal new friends and new support—though not yet enough of each. Otherwise, it would not be necessary for coal to be emphasizing the need for eliminating or alleviating such burdens as unfair competition from foreign fuels (particularly residual oil), inferior uses of liquid and gaseous fuels, discrimination in taxes, lack of governmental consideration in the use of coal in tax-supported and tax-financed institutions, government-subsidized competition, and burdensome freight rates. The fact that operators representing a major and growing segment of the commercial bituminous industry are forgetting—for perhaps the first time—sectional and competitive differences, and are joining together to bring mass power to bear on influencing action on the industry's problems, including those where a solution can come only by action by Congress or governmental agencies, is an adversity plus of the first magnitude.

The industry asks and expects no prop or subsidy, but only that it be accorded a reasonable opportunity to progress through its own efforts. And while it is entitled to ask for and expect fairness and consideration where conflicting interests are involved, basically it can go forward only by continuing to emphasize cost, quality and service, for which there are no substitutes. In fact, on that record alone—and on the additional steps it is taking for even-greater accomplishments in these directions in the future—coal can rest its case for relief from burdens which it cannot lift itself, thus clearing the way for accelerated progress in the future in meeting the ever-growing demand for low-cost energy.

It Pays

MAINTENANCE for increased efficiency and lower cost is the subject of the special report leading off this issue of *Coal Age*—the tenth in the cost-cutting series which started in January, 1953. What good maintenance is and how to get it at minimum cost naturally are the major themes, with the major goal the prevention of breakdowns and consequent increase in the efficiency of both machines and manpower.

Emphasis is on both basic principles and modern practice. How do they work out? Since the report was completed, a *Coal Age* editor has returned from a field trip in the course of which he checked practices at an operation where tons per man is well above the average and machine downtime is well below. Practices followed at this operation parallel almost exactly those recommended in the *Coal Age* special report, and include emphasis on the best in lubrication, rated voltage, trained maintenance men, maintenance-minded supervisors and operators, constant check of machine condition, and regular overhaul. Results? Aside from high tons per man, they include no armature failures on basic units in six years of operation, as well as seven motors on one loading unit that required only undercutting the mica and some commutator turning after service since 1948. It pays.

Maintenance for Lower Cost

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THE MEANING of "maintenance" in coal mining has changed radically in recent years as a direct result of increasing wage rates, the rising use of machinery to offset these increases, and the change to the day-rate method payment, which increases the cost penalties suffered by the company when production is interrupted. Now, "fixing" a machine after trouble occurs, once the leading idea in maintenance thinking, has dropped to last place in the ranking of the three major objectives in maintenance:

1. Prevention of machine breakdowns. This normally is termed "preventive" maintenance but more properly might be termed "production" maintenance, since production and cost depend upon keeping the machine running at full capacity as much of the time as possible.

2. Improvement in machine condition, if possible, or at least preservation of original machine condition and capacity during its useful life, which life, on this basis, is determined by obsolescence rather than wear.

3. Repair after breakdown.

Breakdown Cost the Key

Prevention of machine breakdowns, or "production" maintenance, quite properly holds first place in organizing maintenance. The importance of this principle becomes apparent with a little study of breakdown cost. A loss of an hour's time, for example, can mean a wage outlay, with a 10-man crew, of approximately $25 for which no production is received. Or, looking at it another way, if the unit averages a ton a minute, an hour's delay would mean a loss of 60 tons, increasing the section labor cost per shift, depending upon travel time, 8 to 10c per ton in this instance.

The key is getting the maximum production for the money that must be laid out whether coal is run or not. Wages and salaries are the principal items, but overhead, power for pumping and ventilation, etc., must be included.

The "chain-reaction" principle also has become more and more a factor in maintenance thinking as machines have taken over more of the production load, as more and more productive capacity has been concentrated in individual units, and as the day-rate method of wage payment has become almost universal. Thus, for example, a fall on a loading station or a slide in a strip pit hurts much more now because of this concentration of production and because a much-greater part of the money outlay continues while production stops. Thus, maintenance becomes even broader in scope when keeping production machines running at rated capacity becomes the overriding goal, as it is today.

Getting Efficient Maintenance

Nothing being perfect, breakdowns and production interruptions cannot be completely eliminated, but they can be kept to a minimum by a reasonable expenditure of time and money. As an example, a month's report on six continuous miners working two shifts a day at one operation where tons per man average for the units ranged from 41.0 to 57.3 showed a breakdown total of 150 hr 29 min out of a total of 1,848 possible producing hours, or 8.2%.

But while keeping down time to a minimum is the major goal, a second one is conducting maintenance work with a minimum of manpower and materials.

What can be done in these and other directions to keep production interruptions to a minimum—and to do it at minimum cost—is the goal of the material which follows in this *Coal Age* Special Maintenance Report.

1. Reports and Records

PURPOSES:

1. Providing data on the causes of delays and time lost, thus permitting concentration where the greatest gains can be made.

2. Providing information on equipment condition as a means of forestalling breakdowns.

3. Providing information on the cost of repairs, overhauls and the like as a further check on whether proper operating and maintenance practices are being followed.

It might be said, in fact, that without proper reports and records, even though they involve paper work, no real progress can be made in maintenance. But while paper work is essential, careful study of the types and numbers of forms will reduce it to a minimum—and will make that minimum more valuable.

Maintenance Foundations

Delay Reports and summaries show what is happening and where to concentrate

SECTION FOREMAN'S DAILY DELAY REPORT

MINE _____ DATE _____

SECTION _____ CARS LOADED _____

FOREMAN _____ SHIFT _____

Type Delay	Time	Remarks

REPAIRS NEEDED _____

CONTINUOUS MINER TIME STUDY

Date _____ By _____

No. _____ Place _____ Shift _____

TIME LOST									Total Time Lost	Total Time Operated	Total Time
Shuttle Car	Bolting	Timbering	Moving	Breakdown	Power	Water	Changing Bits	Oil & Grease			
Hr. Min.	Hr. Min.	Hr. Min.	Hr. Min.	Hr. Min.	Hr. Min.	Hr. Min.	Hr. Min.	Hr. Min.	Hr. Min.	Hr. Min.	Hr. Min.

Progress: _____ ft. hdg.
_____ ft. A.C.
_____ ft. x.c.
_____ ft. room

Total Feet _____

No. Trans Cars _____
No. Shuttle Cars _____
Approx. tons per car _____
Approx. total tons _____
Tons per man day _____

Report below only breakdowns:

No. Men		Time	Amount
_____	Foreman	_____	_____
_____	Operator	_____	_____
_____	Operator Helper	_____	_____
_____	Shuttle Car Operator	_____	_____
_____	Loader Operator	_____	_____
_____	Car Trimmer	_____	_____
_____	Others	_____	_____
		Total	_____

Cost Per Ton _____

Bolting: No. Bolts _____

No. Men	Classifications	Time	Amount
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
		Total	_____
		Grand Total	_____

Operator: _____

CONTINUOUS MINER TIME STUDY

No. 1
Month of _____, 19__ _____ MINE

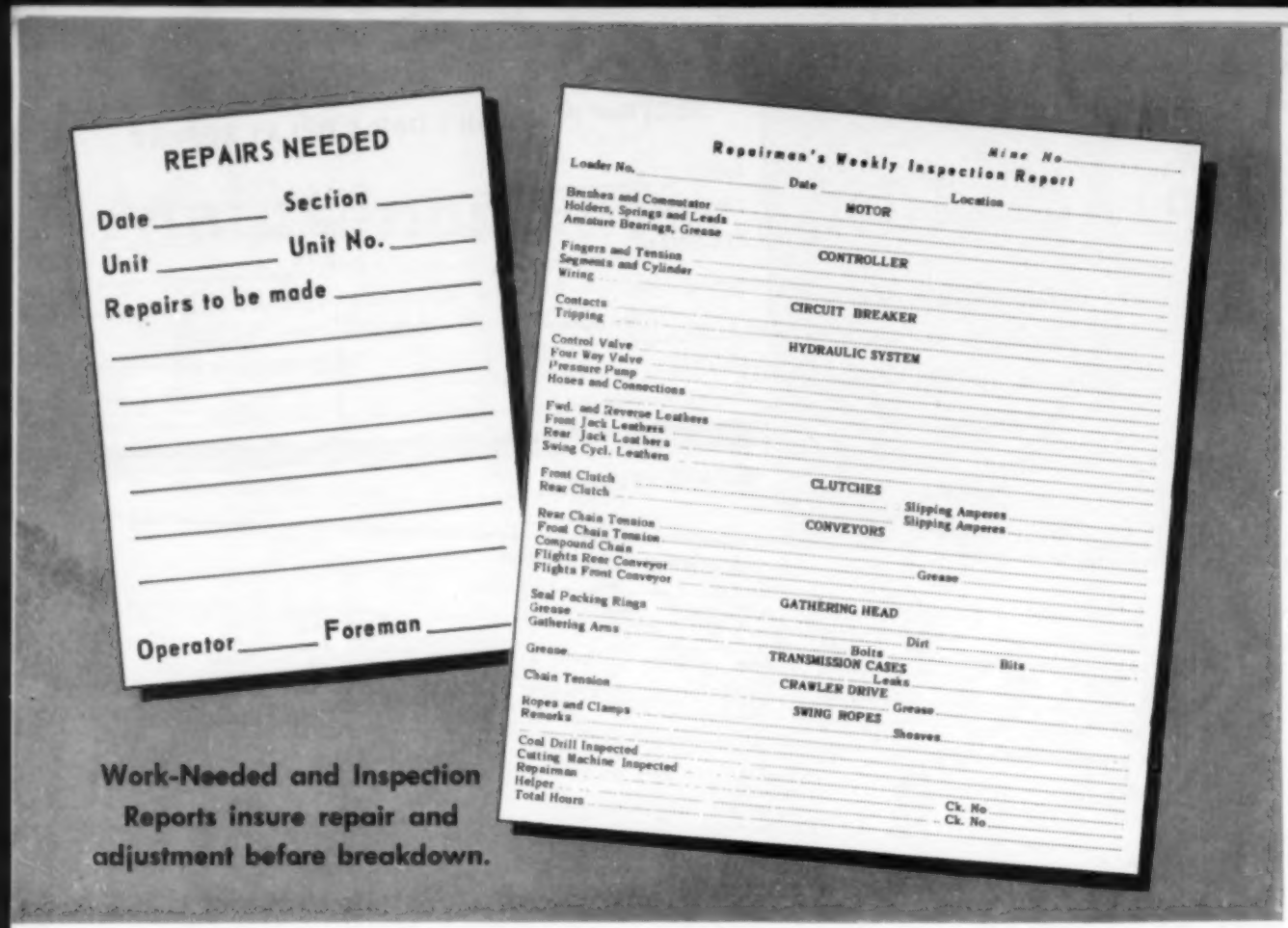
DAY SHIFT

Date	No. Men	TIME LOST: Shuttle Car	Bolting	Timbering	Moving	Breakdown	Power	Water	Change Bits	Oil & Grease	Total Time Lost	Total Time Operated	Total Time	No. Feet Advanced	No. Shuttle Cars	Tons Per Car	Total Tons	Tons Man Day	Total Cost	Cost Per Ton	REMARKS
1																					
2																					
3																					
31																					
Total																					

No. 1
Month of _____, 19__

NIGHT SHIFT

Date	No. Men	TIME LOST: Shuttle Car	Bolting	Timbering	Moving	Breakdown	Power	Water	Change Bits	Oil & Grease	Total Time Lost	Total Time Operated	Total Time	No. Feet Advanced	No. Shuttle Cars	Tons Per Car	Total Tons	Tons Man Day	Total Cost	Cost Per Ton	REMARKS
1																					
2																					



Work-Needed and Inspection Reports insure repair and adjustment before breakdown.

TYPES OF REPORTS AND RECORDS

Daily Delay or Operating Report—In breakdown prevention—the No. 1 goal in maintenance—the daily delay or operating report is a must. It shows what the mechanical and electrical failures were and how much time was lost with each. Also, these reports may be expanded to show other delays and their causes to permit appropriate action. Thus, they become running time studies of machine performance, and provide invaluable data for eliminating the causes of reduced efficiency.

The daily report may be rather simple, per the accompanying example, which concentrates on production and delays only. Or, as in the second example illustrated, it may include details on labor, number of roof bolts installed and so on. In this particular example, two of the items are tons per man and section labor cost, which can serve as a sharp reminder of the value of keeping delays to a minimum.

For top management, and as a running record of results, the delay reports should be combined into weekly or monthly summaries. To accompany the daily continuous-miner report illustrated, for example, a monthly sheet, also shown, pulls everything together in one place. With summaries such as this, it is easy to focus on trouble spots and determine, for example, if a new material, special repair skill or other steps are necessary.

Automatic records of operating and delay time are possible on certain types of equipment. Examples are swing recorders for shovels and draglines, and electric clocks hooked up with feeders in preparation plants so that they run only when the feeders run. Such equipment eliminates human errors in computing or entering lost time and, in the case of the feeder clock, permit checking on how the plant is doing at any time merely by a glance. Swing charts, on the other hand, permit detailed study of what has been happening if it should appear necessary.

Work-Needed Report—To attain fully the goal of preventing breakdowns, some form of reporting on work or adjustments required is a necessity. It permits reporting a part that seems likely to fail so that the necessary steps may be taken to repair or replace it on the next idle shift.

Work needed may be reported either on the front or back of the regular delay form, or it may be reported on a special form. Where it is entered on the regular form, special handling may be necessary to make sure that both the repair foreman and the superintendent, for example, get the data they need without delay. Or, the forms may be made out in duplicate or triplicate and routed accordingly.

Where separate forms are used, the original naturally goes to the repair foreman, with perhaps a copy to the superintendent. In some instances, the form includes space for reporting on when the work needed was done, with or without copy to the superintendent, as a further means of insuring that prompt action is taken.

Inspection Report—As a second means of preventing breakdowns, a number of mining operations have instituted inspection reports. An example is illustrated elsewhere in this section. The frequency of such reports can vary from daily to monthly or longer, with a week or a month as the most common. The reports are derived from special inspections of a varying degree of thoroughness, and normally involve going into certain cases and the like. In other words, the machine is given a more thorough examination than would normally be involved in a quick daily once-over. Inspections may be made by the regular

section electricians or mechanics, or by special men from the mine or central shop. These men at the same time can make certain adjustments and repairs, and can note larger jobs that may require taking the unit out of service.

Unit Cost Record—There is a growing trend toward keeping a complete record of repair parts and labor unit by unit. Labor in this instance normally means special labor beyond the usual attention given by the section mechanic—in other words, shop and special labor required for major repairs and overhauls. Paper work is increased but the accurate unit record provides, among others, these advantages.

1. Excessive expenditures may signal waste or loss of parts sent into the section for running repairs, as well as lack of lubrication, abuse of the machine by operators, and so on.
2. Rising expenditures may signal the need for overhaul earlier than normally scheduled to prevent excessive machine breakdown.
3. Consistently higher expenditures for one type of machine, compared to another of equal capacity, may make it desirable to standardize on the lower-maintenance unit, other things being equal.
4. Data on the value of special materials—for example, stainless steel—can be readily obtained to show if they are worthwhile or not.

For maximum convenience, unit cost records may be kept on cards designed for rotary or other quick-viewing files. The data for the records naturally comes from requisitions for parts and materials submitted by the foremen or other responsible officials, and from reports on parts used and labor expended by the repair foreman. Naturally, also, summaries of the unit records should be made at regular intervals—perhaps monthly—for the superintendent and other officials having jurisdiction.

Record Distribution—As implied in the preceding paragraph, reports and records can be fully effective only when they, or the data from them, are regularly routed to the responsible operating or maintenance heads. Thus, for example, the superintendent or other operating head should receive weekly or monthly delay summaries and unit-cost records. Distribution to other officials, including face foremen, may be helpful as an incentive and also to inform them when delays or costs begin to mount up.

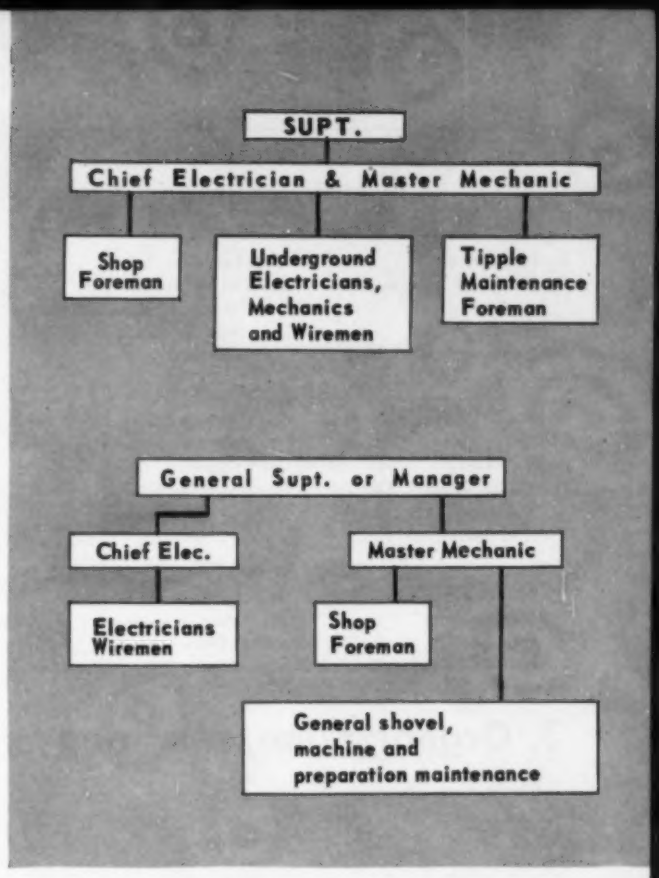
WHO SHOULD FILE REPORTS

The type of report will, in many instances, indicate who should file it—for example, a report on work completed by the repair foreman, or on lubrication by the head of the lubricating crew, if one is employed. Daily delay and operating reports may be filed by the foreman or the operator of the key machine, with some arguing for the machine operator since the foreman may not be with the machine at all times. Operator reports, if that is the system, naturally should be filed through the foreman, who will check and countersign.

Where several machines make up a unit, there may be a question as to whether reports should be required of the several operators—for example, cutters, shuttle-car drivers, etc. Among other things, such reports might be valuable by focussing operator attention on the need for good maintenance and care in operation. Practically, however, one report, especially if prepared by or with the cooperation of the foreman, usually can provide the necessary information.

Reports on work needed likewise may be filed by the operator, the foreman or the section mechanic, working with each other.

Whatever the number and scope of the various reports, the rule should be a practical system.



SHARED RESPONSIBILITY between operating and maintenance departments facilitates efficient maintenance.

2. Responsibility

Rather than emphasizing what any particular department should do, the goal in maintenance is the program—what it should be and what it should do. Once the program is fixed, the responsibilities of the operating and maintenance departments become clear. Under this approach, the responsibility for an effective maintenance program is one for the operating management, which also exercises the final authority.

But while final authority logically rests with the operating department, the cost, capacity and complexity of the new machines now handling coal production require additional skills and manpower to keep them running at rated capacity. Consequently, the responsibility for sustained production which only the maintenance department can discharge is increased. In other words, as a practical matter, production depends to a major extent on maintenance, and the maintenance department must be organized and staffed accordingly.

For an indication of how this works out at the face, the foreman has the responsibility for seeing that his unit is operated with a minimum of delays—in other words, that it produces at the maximum rate. Among the things involved are training of operators to prevent abuse and to induce them to take care of their machines, plus inspection of units and running repairs. The necessary special skills are provided by the electrician or mechanic, and the foreman looks to him for the prevention of mechanical and electrical delays, the maintenance of machine condition, and the quick effectuation of running repairs and adjustments. This illustrates the principle that though the operating department has the final authority the maintenance department is the key to sustained production.

What, Where and Who In Maintenance

FIRST ECHELON	
1. Inspection	Unit foremen
2. Running maintenance and repairs	Face or pit mechanics or electricians (greasing may be handled by greasing crews)
3. Equipment servicing	
SECOND ECHELON	
1. Major inspections	Master mechanic, chief electrician or maintenance foreman
2. Major repairs and replacements short of overhaul	Special task forces or "bull gangs"
THIRD ECHELON	
1. Major repairs outside of section	Maintenance head and shop foreman
2. Overhaul	Shop force

3. Organization, Manning

Getting maintenance done promptly and effectively, as distinguished from organization of the staff, might logically be approached by considering the type of work necessary. This leads to the "three-echelon" system illustrated, which breaks down as follows:

FIRST ECHELON

Inspection and minor running repairs at the face or in the pit make up first-echelon work. Normally, inspection is conducted by the section or pit electrician and mechanic, along with the operators, and the same men handle running repairs and adjustments.

First-echelon work also includes servicing the equipment, such as, lubrication, checking and inflation of tires (trucks at strip pits and rubber-tired equipment underground), cable maintenance and repair, and other similar operations.

Typical setups for manning face maintenance are one mechanic or electrician for one or two units underground, and one or more men for each major class of equipment in the larger strips—for example, (1) shovels and draglines, (2) drills, pumps and compressors, and (3) trucks, tractors, graders, etc. However, organization is subject to considerable variation, and at smaller operations, or at operations with certain types of equipment of a rather simple and rugged nature, running maintenance may be handled by one man or one man and a helper.

Whatever the type of operation, however, the basic principle is assignment of sufficient specialists to a unit or a group of units to keep breakdowns to a reasonable minimum, since overmanning, in maintenance as in other activities, runs up the cost in excess of the benefits in additional lost-time reduction.

SECOND ECHELON

Major inspections involving some opening of cases and enclosures, and also major repair or replacement jobs done during idle periods make up second-echelon maintenance. Part of this work, such as, inspection and replacement of certain units and assemblies, may be done at regular intervals, and part will be done when necessary to avoid a potential breakdown or take care of an actual one.

Such work normally falls to special groups, which may be: (1) permanent task forces or "bull gangs," (2) special groups of men normally employed in the underground or field shop—or perhaps the main shop, or (3) temporary groups made up by assembling the regular section or pit men on offshifts or idle days. Similar task forces normally handle the maintenance of preparation plants.

THIRD ECHELON

Normally, third-echelon work involves complete overhaul of a machine on the basis of time, tonnage, yardage or hours worked. Underground units and small stripping units, as examples, normally are brought to the shop, or sent to an outside custom shop, for complete dismantling and rebuilding, and large stripping units are moved back from the face or out of the pit to prepared overhaul areas.

Aside from equipment, third-echelon work takes in such other activities as the repair of conveyor belts, large truck tires and similar items, for which some companies have special shops or shop sections. Others use custom shops or manufacturers' repair and service facilities.

Since overhaul, in addition to skill in dismantling and assembly, requires, as a rule, basic skills in metal-working and the like, and normally also requires bringing the equipment to the main shop or a prepared overhaul area, maintenance men handling this class of work are largely kept on it alone, though certain men occasionally may be sent into the mine or pit to handle certain face or field jobs. The number of men and the specialties involved again depend upon the situation at the particular operation or company.

4. Spare Equipment

PURPOSES:

1. Reducing the effects of breakdowns.

2. Permitting overhauls without production drops.

One method of alleviating the effects of major breakdowns is keeping spare units on hand, provided the cost of such spare units can be kept within reasonable limits. It is manifestly impracticable, for example, to buy two 30-yd shovels, one to substitute for the other when it breaks down. The goal here must necessarily be one of making sure that breakdowns are kept to the absolute minimum, and that the shovel be maintained in such condition that major overhauls are required only at rather long intervals.

With smaller units, such as underground loading machines, a much-greater opportunity exists for keeping spares on hand without excessive investment. General practice is to provide a spare for each 3 to 5 major production units, such as, loaders, cutters, continuous miners, shuttle cars, etc.

Basically, the number of spares depends upon conditions and particularly on the extent to which preventive maintenance reduces major breakdowns. Time necessarily is involved in getting the inoperative machine out of the way and the new one in, regardless of how close the spare may be. If breakdown time can be kept below that figure without exception, there theoretically would be no need for spare units, except to maintain output during overhaul periods.

But since breakdowns have an annoying habit of causing lengthy delays, there is an opportunity for the spare units, and that opportunity increases as breakdown frequency and time increases. However, there is a drawback. Investment in equipment—and in parts and labor to take care of breakdowns—also increases. The conclusion is that preventive maintenance on the working units is the real

goal, and will reduce the need for spare equipment and also the breakdown cost.

A second factor determining spare-unit practice is the overhaul schedule. With intervals of 6 mo to 2 yr on major underground units and on certain surface units, and with overhauls requiring up to a month or more, spares are a necessity if production is to be maintained at a certain level. Usual practice is to take an underground machine out of the section, or a small portable unit out of the strip pit, and send in the spare unit. Certain underground mines, however, follow the practice of keeping extra completely equipped sections and transferring the crews for the overhaul period, on the basis that moving men is less costly than moving equipment.

5. Standardization

PURPOSE: Simplification of maintenance work, with consequent increase in efficiency, through keeping the types of units to be serviced to a minimum.

Standardization of mining equipment, of course, has its limits, and complete standardization would make it difficult to work in new types of machines and thus take advantages of their characteristics. But with fewer types of equipment, including components such as motors and the like, there is a much greater opportunity for learning all about the equipment and how to handle it. Also, repair-part inventories are reduced and the problem of receiving, storing and issuing parts is simplified.

6. Personnel Training

PURPOSES:

1. Instilling a regard for maintenance principles in supervisors and operators, thus reducing machine abuse and stimulating inspection and reporting of potential difficulties.

2. Increasing the skills and knowledge of the maintenance men themselves, with resultant increase in their effectiveness.

Training is used here in the broad sense of developing both a regard for the value of maintenance and a knowledge of basic principles, in addition to specific work designed to increase the skills of the maintenance men themselves.

Operating Managers and Superivsors—While they need not, perhaps, be required to take formal courses, particularly in the details of maintenance, operating managers and supervisors should know what good maintenance means and how to go about getting it—and also keeping it.

Operators—Here, again, formal courses may be impractical, but since a careless or uninformed operator can raise delay time and maintenance costs significantly, he also should be made aware of what good operating practices mean in both high production and low cost, and of what he can do to prevent machine delays and breakdowns. The logical men to provide him with the necessary information and skill are the foremen and the section or field mechanic or electrician.

Maintenance Men—At least two types of skills are necessary in achieving maximum results in maintenance, repair and overhaul. One type is the basic skill, such as, machining or welding. Three ways of obtaining men with such skills are: (1) hiring men already proficient, (2) hiring graduates of training courses, and (3) setting up company training programs, either conducted on company premises by company-employed trainers, or by outside training establishments to which the employees are sent.

A second skill is proficiency in diagnosing and taking care of trouble on specific equipment units, where a good knowledge of what the unit is and how it operates is imperative. If this skill is not already available, or if it is felt that it could be upgraded, sources of training include:

1. Factory instruction, either at the manufacturing plant itself or through service representatives visiting the mine.

2. Extension courses made available by colleges and universities.

3. Trade-school courses.

Even if only a basic knowledge of electrical and hydraulic principles was gained, the extra insight should result in a better electrician or mechanic, especially if it resulted in his taking more of an interest in his work because it was more meaningful to him.

7. Contract Maintenance

Since outside shops serving a region or a large part of the industry have an opportunity to install more facilities and employ more men with the necessary skills because of the larger volume of business, they are increasingly able to offer major-repair and overhaul advantages, especially to organizations not large enough to support full-scale facilities. Shops now in existence, along with facilities offered by equipment manufacturers, are set up to give speedy, efficient service in overhauling and repairing loaders, continuous miners, shuttle cars and other underground equipment, bulldozers, small shovels, engines and similar equipment for strip mining; plus conveyor belts, tires, motors and other components. Bit sharpening, drill sharpening and other service shops round out the list.

Even though they still may be large enough to support their own facilities, some companies prefer to use the custom shops and thus avoid having to build, staff and maintain their own shops.

8. Rated Voltage

PURPOSE: Preventing motor failures and cable damage by preventing excessive heating as a result of the excessive current which accompanies low voltage.

It is difficult to overemphasize the importance of rated voltage at the motor terminals as a factor in maintenance—and in unit production. DC motors, for example, tend to slow down almost in proportion to voltage drop, and slow-acting machines, plus frequent cable and armature failures, tend to result in don't-care operators.

When trailing cables or motor conductors are subjected to high current overloads—one result of reduced voltage—the resistance of the copper conductors increases, the cable drop rises, the voltage to the machine is further reduced, the machine automatically calls for more current with added heating, and the vicious circle continues—possibly to the point of cable or motor failure. Under extreme conditions, copper can be heated to 600 F or higher, at which point it will burn even if nothing else fails before.

As an example of what can happen, consider a 50-hp motor, 0.85 efficiency, served by a 1/0 cable 300 ft long and trying to do the same work at 270 and 180 v. The extra current loss in the conductors at 180 v could approximate 0.4 kw. On this basis, the extra heat generated in 1 hr is equivalent to between 6 and 7 lb of coal. It is almost the equivalent of operating a household stoker at minimum rate inside a jacket of cable or motor insulation.

MAINTAINING VOLTAGE

Admittedly, the preceding is an extreme case, although not unknown in actual operation, where heat has been known to cause trailing cables to almost explode into flame. It points up, however, the need for maintaining rated voltage at machine terminals, especially in view of the higher horsepowers being crowded into motors used on face machines, and into others as well.

The causes of low voltage include:

1. Substations too far from the working face.
2. Excessive cable length.
3. Inadequate feeder and return capacity.
4. Cables too small.

In addition, excessive heating results from the following:

1. Layering on reels or in piles, decreasing cable rating because of inadequate air circulation.

2. Inadequate or no overload protection. Properly rated fuses or properly set circuit breakers should always be used.

Regular voltage checks therefore become a necessity in preventive or production maintenance, and may even warrant the use of recording-type instruments at strategic locations. Otherwise, the section electrician may well be charged with the responsibility for making regular checks. And to make these checks effective, a program of moving up substations and beefing up feeders and returns as necessary must be followed. This might well be the responsibility of the chief electrician, maintenance supervisor or electrical engineer.

Since even under the best of conditions, heat is generated when current flows in conductors, and the higher horsepowers now being employed in the same or only slightly larger space aggravate the problem, the best in motor and cable insulation should be employed, such as, asbestos-fiber compounds, silicone and the like. Blowing motors is a well-established method of keeping them cool in certain types of service, and cooling by water jackets is coming into the picture for certain motors subjected to the most-severe duty, as on continuous miners.

CABLE MAINTENANCE

Even with rated voltage, delivery of the necessary power to the operating machines usually involves a trailing cable of some type. Aside from low voltage and overload, the major causes of cable failure, particularly underground, are:

1. Excessive Tension—Install spring-type shock absorbers, keep proper tension on reel, adjust reel to prevent back spooling.

2. Mechanical Damage—Avoid running over cables, replace broken sheaves and guides, avoid pinching cable.

Additional data on failures and their causes appears in a comprehensive discussion of cable types and cable maintenance in the December, 1953, issue of *Coal Age*.

In the event a cable fails in spite of all precautions, reducing the time lost requires quick restoration of the service. Some ways of doing this are:

1. Use of compression connectors and special hand or power tools for quick connection of the power and ground wires to save time. Special portable welding equipment also is used to make splices electrically in the section (*Coal Age*, January, 1951, p 70).

2. Use of spare cables to permit quick replacement of the entire cable. An alternative with at least certain types of equipment is the use of sectionalized cables, which not only are easy to install but also lend themselves to the quick replacement of a new section for one that has failed.

Temporary splices should be kept to a minimum. One rule allows six, after which the cable is removed and sent to the shop for rebuilding by permanent welded or compression-connected splices and vulcanizing. Some mines remove the cable with a lesser number of splices. At certain operations where attendants are required at substations or other facilities, these men are provided with the necessary repair and vulcanizing facilities and take care of splicing, vulcanizing and other cable maintenance, thus saving the wages of a repair specialist.

Fault-Finding—Failures in long high-voltage cables, such as on strip shovels, can result in a long search for the trouble point, with attendant loss in production time. Electrical fault-finders now on the market cut this time loss to a minimum by giving a quick and accurate indication of where the failure occurred.

9. Lubrication

PURPOSE: Providing at the right time, in the right place, and in the right quantity the proper lubricant necessary to provide the thin film that prevents bearing wear and consequent machine breakdown.

RESPONSIBILITY

Attainment of efficient lubrication requires acceptance of perhaps three responsibilities.

1. Selection of lubricants and lubrication equipment. This responsibility normally falls on the maintenance department, though the importance of lubrication might well warrant the employment of a lubrication engineer—at least where a company operates several mines and a large number of producing units. Sources of help in lubricant selection include lubricant suppliers and the engineers of the machine builders.

2. Establishment of a lubricating schedule. Scheduling, with attendant reports and records, is perhaps one of the most-vital elements in efficient lubrication, and here again the responsibility rests on the maintenance department or the lubrication engineer.

LUBRICANT APPLICATION

The third responsibility in lubrication is getting the job done, which responsibility may be placed on the maintenance department alone or may be shared by the maintenance department and the machine operators and/or section mechanics and electricians. The lubricating system varies with the type of machine and when and where it is used. The three general systems are:

1. Hand Lubrication. This usually involves grease guns or spout-type or other oilers for fluid lubricants. Where this is the practice, lubrication normally is handled by either the machine operator or the mechanic or electrician assigned to the machine or section, or by a special oiler, as with large stripping units. Lubrication can be combined with inspection and running maintenance, as with belt conveyors underground, for example.

2. Lubricating Trucks and Special Crews. Such trucks are used both underground and at strip pits. Hand lubrication may be desirable for several reasons, including low working height, cramped quarters, or the type of unit, such as, a belt conveyor. However, since individuals with other duties frequently are called upon for lubrication under this system, the chance of human error is greater. Hand lubrication also increases the chances of contamination, and may require stopping the units during the working periods.

The preceding are among the reasons why a number of mines have placed responsibility for lubrication on special crews and have provided them with lubricating trucks. A typical underground truck usually is operated by a crew of two men, who visit all units in the mine or a sec-

SHOVEL NO. _____ **SMALL SHOVEL LUBRICATION RECORD** MONTH OF _____ 19

DAY OF MONTH	1		2		3		4		12		13		14		15	
AFTER INSPECTION OF LUBRICATION WORK IS COMPLETED, SHOVEL OPERATOR AND PIT FOREMAN MUST SIGN REPORT. IN ABSENCE OF PIT FOREMAN, LOADING FOREMAN SIGNS FOR LUBRICATION WORK COMPLETED USE CHECK (√) SIGN / SHIFT	1201	8am 4pm	1201	8am 4pm	1201	8am 4pm	1201	8am 4pm	1201	8am 4pm	1201	8am 4pm	1201	8am 4pm	1201	8am 4pm
HOURS OR MINUTES DEADHEADING																
HOURS OPERATED LOADING COAL, ORE, ETC.																
PARTS LUBRICATED PIT NO.																
(1) Truck Frame and Propelling Machinery (Lower Works)																
All Fittings Below Deck Lubricated																
Circle Rollers Lubricated																
All Cat Assembly Fittings Lubricated																
Propel Bearings Lubricated																
Open Gears and Sliding Surfaces Lubricated																
Enclosed Gear Case Oil Level Checked																
(2) Revolving Frame and Machinery Units (Upper Works)																
All Fittings in House Lubricated																
All Open Gears Lubricated																
Enclosed Gear Case Oil Level Checked																
Hydraulic Oil Level Checked																
Gasoline or Diesel Engine Oil Changed																
Light Plant Oil Changed																
Electric Motors and Generator Bearings Lubricated																
Flexible Couplings Lubricated																
Air Compressor Oil Changed																
Air Filters Cleaned																
(3) Front End Equipment																
All Boom Fittings Lubricated																
Boom Support Cables Lubricated																
Hoist Cables Lubricated																
Open Gears and Sliding Surfaces Lubricated																
Enclosed Gear Case Oil Level Checked																
All Bucket Fittings Lubricated																

(1) TRUCK FRAME AND PROPELLING MACHINERY	PART	HOW OFTEN TO LUBRICATE	TIME TO LUBRICATE
PARTS TO BE LUBRICATED:			
Drive Tumbler Shaft and Transverse Propel Shaft Bushings.	Point Sheaves	3 times per shift	1. Start of shift
Longitudinal Propel Shaft and Propel Brake Shaft Bushings.	Crowd Fittings	3 times per shift	2. Two hours after starting
Center Pintle Thrust Washer Oil Pump (Note Instructions On Pump)			3. At lunch time
Center Pintle Bearing Bushing.			
Take-Up and Idler Tumbler Bushings.			
Steering Clutch Shifter Collars.	Fittings in House	2 times per shift	1. Start of shift
Steering Clutch Sliding Jaw Guide Bars.			2. Middle of shift
Propelling Bevel Gear Cases.			
Cat Side Frame Gear Cases	Circle Rollers	1 time per shift	1. Start of shift
Swing Rack Teeth			
Roller Track Bars.	Cat Assemblys	Mud and Water Conditions	1. Start of shift
Roller Pins.		3 times per shift	2. Two hours after starting
			3. After lunch time
(2) REVOLVING FRAME AND MACHINERY UNITS (Upper Works)		Dry Pit Conditions	1. Start of shift
PARTS TO BE LUBRICATED:		2 times per shift	2. After lunch time
Vertical Propel Shaft and Upper Propel Shaft Bushings.			
Propel Bevel Gears and Sliding Propel Gears.		Deadheading	1. Start before deadheading
Hoist Pinion Sleeve Bushings.		Every 1,000 feet	
Hoist Gear.			
Drum Shaft Bearings	Open and Partially Enclosed Gears Sliding Surfaces	Normal Operating Conditions	1. Start of shift
Intermediate Shaft Bearings		2 times per shift on loading	2. Lunch time
Intermediate Reduction Gear Case.			
Vertical Swing Machinery Gear Case.		Deadheading	
Vertical Swing Shaft Lower Bushing		As often as dry spots appear, or approximately every 1,000 feet	
Electric Motors and Generators			
Hydraulic Pressure System			
Operating Lever Shaft Bearings, Bell Cranks.			
(3) FRONT END EQUIPMENT	Hoist Cables	Every 24 operating hours, Never let hoist drum cable grooves run dry.	When convenient When dry
PARTS TO BE LUBRICATED			
Boom Point Sheave Bushings.	Boom Support Cables	Once a month	While machine is idle
Shipper Shaft Bushings.	Enclosed-Gear Cases	Check oil level once a shift	Start of shift
Saddle Block Bushings			
Dipper Handle and Saddle Block Side Plates.	Hydraulic System	Check oil level once a shift	Start of shift
Shipper Shaft Gear Case.	Air Compressor	Check oil level once a shift	Before starting
Intermediate Gear Case.		Clean air filters and change oil once a month	
Intermediate Shaft Bearings.			
Dipper Padlock Sheave			
Dipper Door Hinge Pins, Padlock Pins, Ball and Handle Pins			
Wire Ropes			

Center Pintle thrust collar at lower end is lubricated by hand pump on truck frame at idler tumbler end. Operate pump plunger two or three times, twice a shift.

GASOLINE OR DIESEL OPERATED MACHINES: Clean air filters, change oil and filters each 100 operating hours. Always drain while oil is hot.

Always wipe off grease fittings to avoid forcing dirt into bearings.

Shovel operator, pit or loading foremen will be held responsible for checking lubrication work done during their shift, also the keeping of monthly lubrication record chart on shovel up to date.

Pit or loading foremen and operator are to sign record chart at end of their respective shift.

It shall be the duty of day shift pit foremen to see that there is enough lubricating materials and equipment on shovel to carry over the afternoon and midnight shifts at all times

Inspections of mechanical and lubricative conditions of shovel will be made by maintenance supervision and lubrication engineer during all shifts.

Lube Engineer

GOOD LUBRICATION MEANS

- SAFETY
- LOWER OPERATING COSTS
- FEWER SHUT-DOWNS
- MORE PRODUCTION
- JOB SECURITY

LUBRICATION EFFICIENCY is promoted by definite scheduling and reporting, as with this form for small shovels.

tion of the mine once a day on the off shift. The truck usually is equipped with tanks for two types of lubricants, with a third tank for hydraulic oil, and may be provided with hoses for blowing fittings, motors and the like as necessary with air from the compressor used in dispensing the lubricants. Where the truck is trackmounted and offtrack equipment is employed, the offtrack equipment may be brought to the loading station once a week, for example, for thorough inspection and lubrication, with lubrication by hand at other times. The truck crew also fills lubricant containers for hand lubrication.

As for results, one mine bought a truck to serve eight loaders and nine cutters, and in the first 18 mo of use had only three bearing failures. Lubricant consumption

was reduced 65% in the same period. Another mine using a truck reports that a loader can be greased completely in 10 min.

Trucks for strip equipment also may include fuel-dispensing equipment. One such unit comprises a gas-powered compressor, lubricating pumps, four lubricating hoses on reels, and four fuel drums with the necessary hoses. Air pressure is used for dispensing fuel as well as lubricants, and the unit serves tractors, drills and other smaller mobile units.

3. Centralized Automatic Lubrication. Minimum manpower and positive lubrication at all times are among the reasons for the rise in use of centralized automatic lubricating systems in coal mining. These systems dispense either grease or oil—more usually grease—and among other advantages reduce the chances for contamination to almost nothing, since the lubricants usually are dispensed from the original containers or if not, with a minimum number of transfers. Applications of centralized automatic systems include:

1. Loaders, cutters, continuous miners and shuttle cars underground. In some instances, the systems are designed to give the bearings a shot whenever the machine hydraulic system goes through a cycle, thus requiring no manual attention whatever. Some, however, prefer to leave start of the lubricating cycle to the operator because with automatic initiation there is the possibility of overlubricating, with grease getting into, for example, motor windings.

2. All bearings in preparation plants, with the possible exception of motors. Automatic systems, in fact, have included dispensing of grease to underwater bearings on sludge conveyors.

3. Heavy-duty off-highway trucks, including wheel and steering bearings.

4. Large stripping shovels and draglines, and possibly other smaller units. One company divides between hand and automatic lubrication of stripping equipment on the bases of (a) cost of special lubricating equipment v. the type of machine and its expected life, and (b) the fact that in many instances the man still would be necessary. Other major factors in this company's program (*Coal Age*, January, 1952, p 76) include lubricant standardization, detailed scheduling of lubricant application, reports on lubricant application, and prevention of contamination.

Results reflect (1) a reduction in the cost of lubricating materials—from 3.05c per ton in 1944 to 2.20c in 1950, in spite of increases in material cost, (2) a reduction in maintenance expense, and (3) a reduction in the losses in production time. The program includes both pit and preparation equipment, and at that time the reduction in cost of maintaining stripping equipment was estimated at $75,000 a year, and of maintaining a dry preparation plant (centralized lubrication), $20,000 a year.

SEALS AND FITTINGS

Effective lubrication, in addition to all the other factors involved, depends upon (1) the lubricant getting into the bearing, and (2) the lubricant staying in the bearing. Therefore, fittings, oilers, grease cups and the like must be of the proper type and must be in condition to function as needed. Otherwise, no lubricant. A No. 1 job of any men handling lubrication therefore is to check to make sure the fittings and lubricators are in operating condition, and to report promptly if they are not.

Bearing seals are unglamorous but nevertheless are vital to make sure that the lubricant is retained so that it is available for the job it is called upon to perform. The best in seals therefore is a necessity, and they should be checked thoroughly and frequently, and replaced when necessary. Among other things, this reduces loss of lubricant.

SCHEDULING

An efficient lubrication program depends upon definite scheduling of the work, accompanied by definite instruction as to the type of lubricant to be used. This means a written document for the information and guidance of all who have anything to do with lubrication, and this document may also serve as a report on work done. Tags enclosed in plastic envelopes may, for example, be tied to tractors, with one side of the tag showing points to be lubricated, type of lubricant to be used, and when lubrication is to be done, and the other side serving as a record of lubrication performed. Similar, more comprehensive schedules may be posted in strip shovels and preparation plants, or supplied to foremen and mechanics underground. In any event, the goal is to have something definite and thus avoid hit-or-miss application, buckpassing and the like.

REPORTS AND RECORDS

Unless somebody checks, adhering to an efficient system in lubrication, as in all other activities around the mines, is practically impossible. This means reports and records which, even though they involve paper work, provide the basis for intelligent operation and control.

Reports may be rather simple in nature, merely recording that a certain machine was lubricated on a certain date. An important item in any report, however, is whether certain bearings refused to take lubrication or took too much, since this is a signal that trouble is probably in the making. A rise in quantity used on each machine or in each application is a further signal that machine condition is deteriorating, or that certain parts need attention. And if experience has shown that adequate lubrication can be secured with certain quantities of materials, figures on quantities used also will reveal waste and loss through contamination or otherwise.

Quite frequently, as noted in the previous section, the lubrication scedule and the report can be combined into one document. An example illustrated is a combined schedule and report for a small stripping shovel lubricated by hand.

LUBRICANT SELECTION

The recommendations of the equipment manufacturer are the starting point in lubricant selection, with the second major source of data the service departments of the oil companies. A third source of information, provided proper records are kept, are the lubricating and delay reports, which may indicate that a change in type is necessary. When all the preliminaries are completed, lubricants then should be bought on specification rather than on general representations, and the rule should be the highest possible quality in view of the penalties now suffered as a result of equipment breakdowns. The latter, for example, comes into consideration when gear oils, for example, are being specified. Use of the extreme-pressure type covers all applications with a quality product and eliminates the chance of misapplication in lubricating the operating units.

Standardization—Too many types of oils or greases lead to confusion, misapplication, contamination and loss. Careful study of the lubricating problem will show, in many instances, that a lesser number of types of high quality will do the job, since the variety of lubricants available includes many with the necessary spread in characteristics fitting them to several applications.

As an example of what standardization can accomplish, one large stripping organization, also operating a large and modern preparation plant, cut the number of lubricants from 29 to 9, as follows:

	Types	
	Before	After
Motor oil, heavy-duty detergent	2	1
Gear oil, all enclosed gear cases	4	1
Antifriction-bearing grease	5	1
Plain-bearing grease		1
Open gears	3	2
Cable dressing	5	1
Compressor oil	3	1
Hydraulic oil	7	1
Totals	29	9

10. On-the-Job Supplies

PURPOSE: Keeping delays to a minimum by having the necessary parts in or close to the working section or pit face.

If a part is not close at hand, what might be only a minor breakdown can turn into a major stoppage if the item, such as a chain link or hydraulic hose, is missing, requiring a special trip to the supply house or the main shop. Limiting down time therefore requires keeping an adequate stock of the smaller, frequently used items in the section or pit, where they are readily available for the mechanic or electrician. Where heavier, less frequently used parts or critical assemblies are involved, one or more can be kept at a central location, perhaps on a truck or carrier, but still handier to the working sections or pit than in the main supply house or shop.

To prevent loss or damage, section parts should be kept in a supply cabinet, a parts box, or in lockers, drawers, etc., in the foreman's or repairman's shanty or office. Some mines also have found it advisable to keep certain special tools with the parts so that they are handy when needed. Lamps or other heating facilities should be provided for parts subject to damage by moisture.

11. Mobile Repair Units

PURPOSE: Reduction of breakdown loss by getting men, tools and materials to the scene quickly; also more effective use of time and wages paid to repairmen.

The repairman's jeep, with space for carrying parts and supplies and lockers or compartments for tools, has become a fixture at many underground mines because of the speed with which it can deliver both men and materials to the scene of a breakdown. Similar units also speed up the work of wiremen, bratticemen and other service workers. Other mobile maintenance units include welding trucks—gas and electric—where there is an opportunity to use such equipment in fresh air. For bringing units to fresh-air locations, and for other purposes, including moves, crawler-mounted pullers or carriers have been found very useful at a number of mines, especially in low coal. And where machines must be moved long distances, such as loaders, miners and shuttle cars to main shops, lowbed transporters speed up the operation and save wear and tear on the units.

Where pullers are not available, several tricks may be employed to move disabled machines—for example, a drill motor with an adapter to power the crawlers on a loader for short moves.

Mobile maintenance equipment at one strip operation includes the following, aside from greasing and fuel trucks:

Small-tool truck for all types of small hand tools and parts normally required on maintenance jobs.

Large-tool trailer for transporting heavy tools required in major jobs on big stripping units.

Flat trailers for moving wood blocks, cribbing and the like.

Special heavy-duty trailer for hauling buckets and shovels up to 100 tons.

Small-parts truck.

Truck-mounted crane with boom sufficiently long to handle all lifting jobs necessary in maintaining 40- to 50-yard shovels.

Welding trucks.

The number and variety of units reflects the fact that this is a very-large operation. At a smaller strip plant, this number and variety would not be practical, but a welding truck plus a general repair truck, or one truck for both purposes, represents possibly the minimum of mobile units.

COMMUNICATION

If for no other reason, a good communication system from the face or pit to the main office and repair shop normally will pay for itself through reduction in breakdown losses alone. In strip pits, two-way radio is one of the answers, and includes certain mobile units such as in the superintendent's car, the repair foreman's car or truck, and the cabs of the key stripping units. A good telephone or trolleyphone system yields the same results in deep mines.

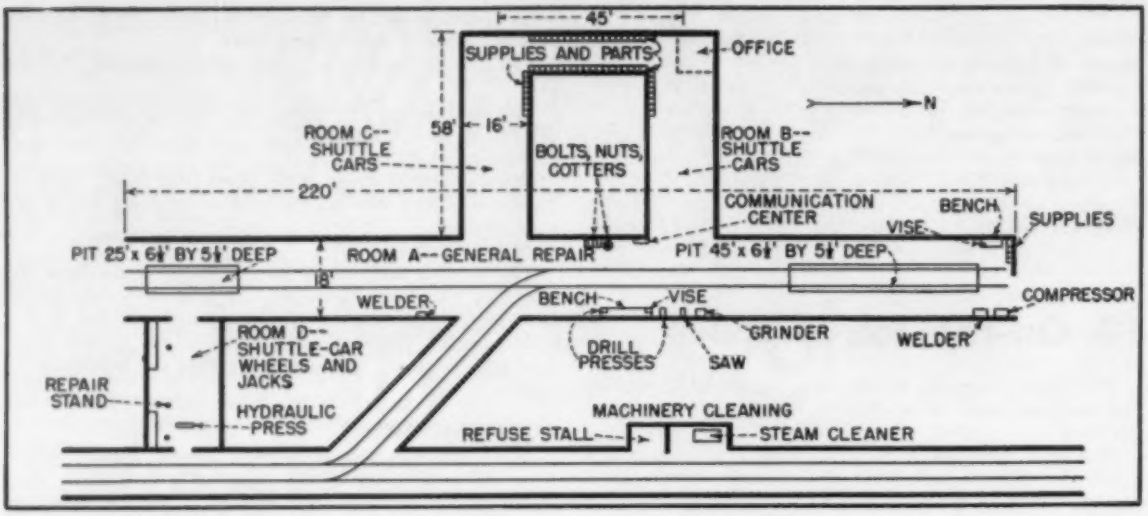
12. Mine Shops

Although a few deep mines make a practice of maintaining machines up to the stage of semi-overhaul in the working sections, lack of space, the difficulty of doing welding, light and coal dust, among other things, normally dictate the transfer of major repairs, replacement of assemblies and semi-overhaul to shops maintained for that purpose. Some of these conditions do not prevail in strip pits, and consequently there is a greater opportunity for doing second-echelon work away from the shop. And with large stripping units, the only practical way to work on them is in the field in special repair areas, though some components and assemblies are processed in the shop or shops. In preparation, also, the nature of the plant and equipment also dictates doing a major part of the work on the job, though parts and assemblies may be removed for shop repair and return.

SHOP LOCATION

Deep Mines—Distance and whether or not the equipment must be hoisted up slopes or shafts are among the factors involved in location of deep-mine shops. A third is facilities for quick moving of units from the face to the shop and back, such as, special transporters. Where good transportation facilities exist, and hoisting is not involved, it may be possible to locate mine shops on the surface and thereby get the advantages of space, natural light and the like, including convenience, at a somewhat smaller expenditure. But where the distance is great, and where hoisting is involved, there are strong reasons for locating the shops underground. With proper planning and design, they can be made almost as convenient as surface shops—and as efficient—and have the major advantage of being closer to the actual working sections.

Moving the shop as the mining location shifts also is possible with certain types of mining—contour in particular, as well as auger. Some such operations use small prefabricated buildings mounted on skids or trucks as shops or supply houses or both, moving the unit or units



MODERN MINE SHOP includes machinery-cleaning section and special rooms for certain equipment and parts.

as needed as the mine opening moves around the outcrop.

Certain types of maintenance work, such as cable repair (Sec. 8) may be done in small specialty shops setup at substations or other points where attendants are necessary to take advantage of what otherwise would be idle time.

Strip Mines—Central location and convenient access from highways, both on the property and off, are among the considerations involved in locating strip-mine shops. Frequently, these considerations result in the shop being located with the other mine facilities, such as, the mine office and the preparation plant, especially since big units are necessarily repaired in the field and trucks, tractors and small units can be brought in under their own power or by the use of transporters, even when they are not required to come to the preparation plant regularly. An exception might be a truck garage and shop where the trucks haul to field stations or to rough cleaning plants moving coal to central plants by rail after rough cleaning.

Specialty shops employed by some stripping organizations include a portable welding shop, fabricated from corrugated steel, and mounted on wheels, and large enough to go over a truck or other unit. This facilitates body and other repairs where the unit cannot readily be brought into the shop without dismantling.

SHOP FACILITIES

Even the simplest deep-mine shop for major repairs, replacement of assemblies and the like should be equipped with a pit, hoisting facilities and a parts store room, plus the necessary special tools required for the work done. Parts-cleaning equipment should be installed if possible to speed up this operation and facilitate subsequent work.

At the other end of the scale, mine shops may be large and elaborate and able to handle everything up to complete dismantling and reassembly of all types of machines. The plan for one shop of this type is shown in the accompanying illustration. Located near the bottom of the hoisting shaft, the shop includes high-intensity lighting, a general repair section with two pits plus overhead cranes and small hoists, two bays for shuttle-car service with hoisting facilities, an office, cabinets for parts, a room for repair and servicing of shuttle-car wheels and hydraulic-jack units with monorail crane, and a cleaning recess with permissible-type steam cleaner supplemented by a refuse stall. Tools include saw, floor-type drill press, vises, bench drills, floor grinders, hydraulic press, welding machines, and portable electric and air grinders. Facilities also include 32 tool cabinets built into the walls, and a compressor.

A similar range in scope of work and facilities installed prevails at strip-mining operations, although with these the tendency is to make the mine shop into the main shop.

IN-PLANT FACILITIES

Though not a part of shops, certain permanent facilities of a shop type serve very useful purposes in certain maintenance applications. Examples are compressed air and welding gas lines and outlets in preparation plants, and arc welders in preparation plants and strip shovels. Time saving is the major advantage.

13. Overhaul Scheduling

Five of the standards for determining when overhauling is necessary are:

1. Elapsed time—in weeks or months. In other words, machines are taken out of service at specific intervals for overhaul.
2. Operating time—in hours or days.
3. Tonnage or yardage handled.
4. Inspection.
5. Personal judgment.

Each of these standards has its supporters among maintenance and operating men, though more of them seem to operate on the basis of a combination of inspection and hours operated or tonnage or yardage handled. Where the number of units is large, on the other hand, supporters of the elapsed-time standard point out that a rigid schedule is necessary to permit getting around to all the machines without jams resulting from two or three coming up for overhaul at one time.

A sixth system is, in effect, no overhaul—or overhaul only at long intervals. Under this system, known as unit replacement, overhaul is accomplished by replacing assemblies, such as rear conveyors on loaders, crawlers or shovels and the like, removing the replaced assemblies to the shop for overhaul and storage until another assembly on another machine comes up for replacement.

Certain other tests may be used to determine when major attention or overhaul is required. Oil pressure on truck engines is an example, as is rising lubricant consumption on, for example, cutting machines. In any event, the goal is to take the machine out of service when condition or an increase in down time indicates that major breakdowns will become excessive.

14. Main Shops

Main shops generally are defined as establishments where work beyond the removal and replacement of parts and assemblies is done. It is difficult, however, to be precise as to what main shops are, since they vary widely in goals, scope of work handled, and equipment. Normally, however, their main business is major repair and overhaul, and to facilitate this they usually include machine tools and other equipment not found in mine shops. On the other hand, main shops can function as mine shops, and they may also, in some instances, include facilities for manufacturing repair parts and even complete equipment units, such as, for example, pumps and shaker pans.

CENTRAL UNITS

Where several mines are operated by a single company, the question arises as to whether to have a main shop at each operation or a big central shop for all. The trend seems to be toward centralizing main-shop work in one plant, especially where good highway and rail connections are available. The advantages include:

1. Less duplication of equipment and facilities, in turn providing an opportunity for adding extra facilities in the main shop without increasing overall expenditure.

2. An opportunity to provide additional repair and maintenance skills because the volume of work is sufficient to warrant employment of certain specialists.

3. An opportunity for increasing efficiency because of the greater volume of work in one place.

4. Less duplication of parts and supply inventories, and consequently a reduction in inventory, as a result of concentration of operations.

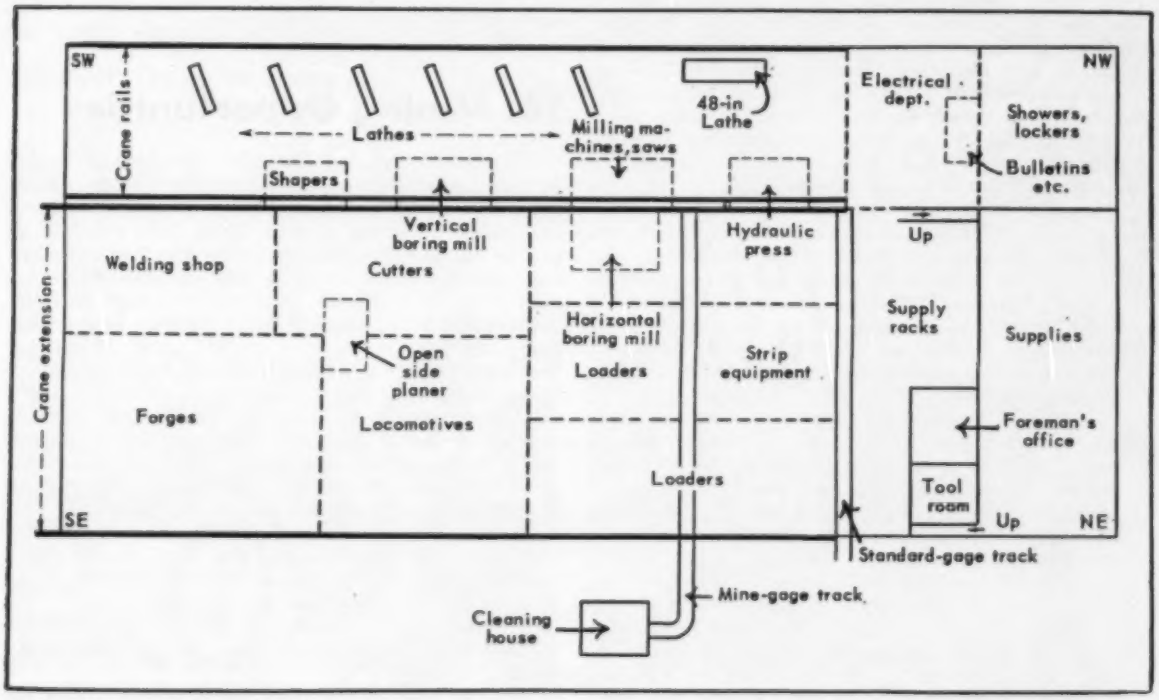
SHOP TYPES

Main shops may include types aside from the general overhaul and repair units devoted to machine reconditioning. Examples are: conveyor-belt shops, cable shops, garage and truck-repair shops, wheel-reclamation and welding shops, truck-tire shops, mine-car shops and so on. Such shops may be separate or may be incorporated into the main shop via separate rooms, bays and the like, and, of course, are warranted only when the volume of specialized work is sufficient to make them practical.

SHOP LAYOUT

Since size of operation, type of equipment, type of work done and other factors vary widely, no prescription can be given for a typical main or central shop. A summary of layout and facilities for three specific shops, however, is as follows:

Strip-Mine Service Center—L-shaped shop, warehouse and garage structure, with 66x215-ft garage as the base of the L; next, a 59x32-ft warehouse; and, completing the upright of the L, a 59x84-ft machine shop. Thus, the warehouse is conveniently located between the machine shop and the garage. The garage is fitted with 10 rollup doors, and handles the maintenance and repair of all gasoline, butane and diesel equipment and pumps (but not motors), as well as serving as the headquarters for the maintenance of two small walking draglines. Extra engines, and some heavy spare parts, including some rear ends and transmissions, are kept in a fenced-off enclosure in the garage, which is equipped with a 2-ton hoist on an overhead track.



MAIN SHOP LAYOUT provides separate bays for certain equipment, and separate sections for reconditioning parts.

The warehouse includes a 25x25-ft partitioned section in one corner serving as the electrical shop. Warehouse facilities include convenient outdoor storage for heavy shovel parts while lighter parts that can be brought inside —via a 5-ton chain hoist mounted on overhead rails— are stored on the floor. Bins, of course, are provided for the smaller items.

The machine shop does work for the garage, electrical shop and the field force, and is equipped with three radial drills—one large and two small; horizontal lathe, 20-ft bed, 36-in swing; 12-in lathe, 18-in utility saw, shaper, bolt machine (up to ¾ in), three hand-welding machines, automatically controlled gas-cutting unit, automatic continuous welding machine, two 5-ton and two 2-ton chain hoists. Work done includes building dipper sticks 63 ft long or more.

Equipment serviced includes a stripping shovel, loading shovel, two small draglines, 13 semitrailers, 14 tractors, two winch trucks, two bulldozers and two road patrols.

Deep-Mine Central Shop—Three-building establishment, all connected with doors wide enough and high enough to permit passage of portable cranes, thus avoiding the use of heavy overhead cranes and hoists; windowless Quonset construction, with fluorescent lighting. Unit functions and equipment are:

Building 1, 40x100 ft, rebuilding shuttle cars, loaders and continuous miners; steel work benches, two bench drills, vises, two 300-amp portable welders, gas-welding equipment, air-operated impact wrenches and portable drills, test panel for mercury tubes.

Building 2, 40x100 ft, rebuilding rubber-tired cutters, rubber-tired coal drills, roof drills and other mining machinery; wall-type work benches, special floor-type work bench for repairing shuttle-car wheel units, two welding machines, cable vulcanizer, cable-conductor welder, and 150-kw rotary converter for DC test power.

Building 3, double Quonset 60x80 ft plus single Quonset 60x40 ft, building up and machining parts for mines and preparation plants; wheel press; 20-in, 48-in and two 24-in lathes, milling machine, radial drill, 20-in shaper, bolt threader, slotter, metal-cutting band saw, bit cutoff machine, blacksmith forge, air compressor for the three buildings, two degreasers, heating boiler, welding machine, and floor controlled bridge crane across lathe bay; also toilet and shower facilities in 20x20-ft room.

Four portable cranes handle equipment in all three buildings. Two are 5-ton gasoline-powered units and two are 500- to 1,000-lb hydraulic push cranes.

Deep and Strip Shop—Though designed primarily for the complete rebuilding of underground equipment, this shop (floor plan in the accompanying illustration) also handles certain work for the company's strip operations. Size of the two-story building is 213x95 ft inside, and it includes offices and a supply room. Principal units of equipment and arrangement of facilities on the main floor are shown in the illustration. A modified assembly-line procedure is followed, with types of machines assigned to certain bays, and parts removed to service bays for reconditioning before return to the unit. An outside cleaning station is a major contribution to quality and efficiency.

While, as noted, shops vary widely in character and facilities, certain practices and equipment lead to higher quality of work at lower cost. These include: good light, convenient lockers and work benches, special benches and stands for certain work (shuttle-car wheels, for example), supply depots in the shops themselves or at least close at hand, hoisting equipment for lifting and moving anything heavy, including such things as shafts into lathes, and power-operated tools—impact wrenches, etc. Cleaning and degreasing equipment contributes greatly to comfort and efficiency in repair work.

15. Maintenance Materials

Hardsurfacing products are an example of materials that cut maintenance cost by increasing the life of machines and parts subject to wear, reducing the number of replacements and consequently saving not only in parts and materials but also in labor for replacement.

Examples of the other materials and parts that may be employed to lengthen machine and part life, reduce breakdown time and cut the cost of maintenance include:

1. Stainless and other alloy steel, aluminum and so on for strength, light weight and corrosion resistance in mine cars, truck bodies, stripping dippers, cages and skips, and so on. Light weight, provided there is the requisite strength, in itself reduces the maintenance load, or light weight with high strength permits building up parts without increasing total weight, thus reducing the chances of failures.
2. Stainless steel, manganese-steel and bronze for reducing wear and corrosion in coal screening.
3. Special alloys, bronze, rubber and other corrosion- and abrasion-resisting materials for pumps, valves, fitting and other equipment handling water and wet materials.
4. Use of lime, by means of automatic feeding equipment, in wet-preparation plants where acid is a problem to reduce corrosion.
5. Cast iron, alloy, asbestos-cement, lined or plastic pipe for mine and other water lines to resist acid.
6. Rubber, tile, sprayed sand-cement and other corrosion- and abrasion-resisting materials for tanks and storage bins. Some companies have made complete bins of steel-supported glazed tile to resist abrasion and corrosion.
7. Glass, stainless steel and other wear-resisting materials for chutes, conveyor bottoms and similar applications.
8. Aluminum, protected-metal and other weather-resistant siding and roofing for preparation plants and other structures.
9. Protective coatings and paint.
10. Silicone, asbestos and other long-lived heat-resistant insulation for electrical equipment.

16. Mining Opportunities

In its broadest sense, maintenance goes beyond the care of operating machines and equipment and takes in many other installations around the mining plant. In other words anything that can fail or slow things down can hold up production, and therefore should be checked and cared for regularly. And if it fails or must be replaced quicker than it should if properly handled, extra expense is involved not only in the new material that must be provided, but in the labor to take out the old, clean up and put the new in place. In this broader sense, therefore, some of the steps that may be taken are:

1. Maintenance of a good haulage system, including regular attention to track condition, since poor track slows down haulage speed and results in wrecks, hampering production and also running up expense for cleaning up and repairing track and equipment. Even aside from these considerations, materials used in track construction can have a material effect on operating and maintenance cost. A treated tie, for example, can last 10 yr or more, against 2 or 3 yr for the average untreated tie.
2. Prevention of roof falls, which also stop production and require cleaning up even if no men are hurt or equipment is damaged.
3. Good weatherproof roads with minimum grades and good running surfaces for truck haulage at strip pits.

3½-YD DRAGLINE removes 15 ft of shale to expose 24-in Alton seam in 80-ft-wide cuts. This unit works from a bench on the harder shale after soft surface material has been removed by a shovel-and-bulldozer team.

Efficient Stripping With Smaller Excavating Units

Operating the northernmost coal mine in the Appalachian Region, in a sportsmen's paradise, leads to some special problems. Here's how P. & K., Inc., keeps its house in order while doing the job.

TO THE BEST OF OUR KNOWLEDGE the northernmost coal-mining operation in the Appalachian region, which spread-eagles the eastern states from Alabama to Pennsylvania is the stripping job of P. & K., Inc., at Port Allegany, McKean County, Pa. Here

TANDEM-STRIPPING SYSTEM employs this 2½-yd shovel removing softer material down to the shale. As shown in the right photo, shovel makes two passes per cut, requiring bulldozers to push second-pass material into spoil area.

WHEN WET WEATHER fouls up haulage the loading shovel and pit trucks are assigned to road construction, while the screening plant, at right, is fed from a 10,000-ton stockpile which has been built up near the plant during dry seasons.

VISUAL COMPARATOR, used here by Ray Prushnok, general manager, determines pH values in nearby streams or in accumulations of water in pit or spoil. Low-pH water is treated with lime before it is released into local drainage system.

Stripping in a Sportsman's Paradise

In Pennsylvania's heavily-wooded northern tier, the company recovers the 24-in Alton seam, lying fairly level under cover which consistently runs about 30 ft in thickness. And all the while the gobbling of wild turkey competes for attention with the diesel throb of the stripping equipment.

Limited at present to the use of smaller excavating machines, P&K has developed methods for teaming up a shovel, dragline and bulldozer for effectively removing overburden.

The screened coal, which is sized in a truck-loading tipple, is offered as industrial fuel. A represensative analysis (as-received basis) reads as follows:

Moisture	2.01%
Volatile matter	35.36%
Fixed Carbon	54.60%
Ash	8.03%
	100.00%

Sulfur	2.17%
Btu per lb	13,675
Ash-softening temp	2,400 F
ASTM coking index	7

Officials of the firm are John Prushnok, president, with headquarters at Punxsutawney, Pa.; James Small, vice president, and Ray Prushnok, general manager. The working force of 22 men, 17 in stripping and 5 at the screening plant, produces 350 tpd on a schedule of two-shift stripping and single-shift loading. The entire output is shipped to market in trucks.

BENCH STRIPPING, USING SHOVEL, BULLDOZER, DRAGLINE

The 30 ft of cover consists of from 10 to 15 ft of topsoil and other soft material at the surface and the remainder is a layer of shale. Drilling and blasting is unnecessary.

The opening cut is made 40 ft from the outcrop with the 2½-yd Northwest

LAND RECLAMATION is a continuous job, closely following final recovery of the coal. Spoil banks are leveled and compacted by bulldozers.

80-D shovel leading the procession of stripping equipment. Complete cuts are from 75 to 80 ft wide, and the shovel removes the softer material down to the top of the harder shale in two passes. Spoil from the first pass is dumped into the preceding cut after the coal has been loaded out. On the second pass the shovel cannot reach the spoil area in the preceeding cut. Therefore, it dumps material from the second pass on the bench it has constructed in the first pass.

A bulldozer assists the stripping shovel in this latter phase by pushing the material from the second pass off the bench into the permanent spoil area. In this work both the shovel and the bulldozer are used to best advantage since the shovel works at a minimum swing angle and the bulldozer can make a level attack on the benched spoil from the slot provided by the shovel. This eliminates any need for the bulldozer to operate as a digging unit, a type of service which only results in reduced efficiency and higher maintenance cost. The company operates three bulldozers, two International TD-24's and an Allis-Chalmers HD-19, for assisting the stripping unit, leveling spoil banks, constructing roads and clearing land to be stripped.

A 3½-yd Lima 1201 dragline follows the shovel and bulldozer and works from the bench constructed by them on top of the harder shale. The dragline works the 80-ft width of cut in a single pass, spoiling the shale on top of the material pushed into the previous cut by the bulldozer. The shovel and dragline advance at about an equal rate because although the shovel works in softer material it must make two passes and the dragline bucket is 40% larger.

LOADING, HAULING AND SCREENING THE COAL

The top of the exposed seam is cleaned by an Allis-Chalmers AD-3 grader, although company officials plan to provide a mechanized broom in the near future for this purpose and free the grader for full-time duty on road maintenance.

The loading shovel is a 1½-yd Lima 604 and the haulage trucks are two 20-yd Euclids. Haulage distance is about 2 mi from the pit to the screening plant. As shown in an accompanying illustration, a considerable amount of coal had been exposed for loading at the time the operation was visited. This occurs during unusually wet periods when haulage becomes a problem. At such times the screening plant is fed from a 10,000-ton stockpile which has been built up during the open weather. Therefore, both tipple and pit may work steadily even though transportation between them may be disrupted.

Good use is made of this time, however, by using the loading shovel and the haulage trucks in the construction of new roads through the spoil areas and in hauling stream-washed gravel to stabilize the traffic surfaces of existing roads. A 1½-yd Hough Payloader loads gravel as needed and also reloads stockpiled coal for final screening.

Raw coal is fed to the screening plant from the truck hopper on an elevating 30-in belt conveyor which discharges to the sizing shaker. Stoker, pea, nut and egg sizes are stored in four 60-ton bins under the shaker. Another bin outside the plant holds the product of a crusher which may be used to break down any of the coarser sizes to increase stoker-coal yield when necessary.

Trucks of local or long-distance haulers are loaded directly from the bins under the plant and weighed on a Toledo truck scale which has a platform long enough to accommodate the largest tractor-trailer combinations.

HANDLING WATER AND RECLAIMING STRIPPED LAND

P&K operates in the stamping ground of a number of Pennsylvania's sportsmen. Wild turkey, as mentioned, and deer are numerous in the area, and the streams provide good fishing. But this location, delightful though it is, places special responsibilities upon the company. Guarding the purity of the streams and doing a good job of backfilling are part and parcel of daily operations.

Working closely with officials of the Pennsylvania Departments of Mines and Forests & Waters, company officials constantly patrol the operations, checking pH values of any accumulations of water in the pit or in spoil areas.

If the pH is satisfactory, that is, within the limits prescribed by state officials, a ditch is cut through the spoil banks to release the accumulated water, or it may be pumped over the spoil banks. If the pH is too low, however, the body of water is treated with a slurry of hydrated lime until tests show that the water is within accepted limits, neither excessively acidic nor excessively alkaline.

The pH determinations are made with a Hellige visual comparator in which methyl red, methyl orange or other reagents are used in samples of the water to be tested to provide visual comparisons against standard colors representing various pH values. Streams in the area also are tested frequently in this manner as an added precaution.

In backfilling, company officials have ruled that worked-out cuts will be backfilled with spoil to a depth of at least 4 ft above the original elevation of the top of the coal. The remainder of the spoil then is bulldozed outward to provide a surface as level as possible for future planting. This work is continuous, employing all three bulldozers when they are not engaged in the duties previously mentioned.

Modern methods at the face . . .

Backed up by good transportation . . .

Means more tons per man—at railroad car

Keys to Higher Efficiency at Lancashire 15:

1. Modern Face Methods
2. Improved Transportation

The adoption of continuous mining and mechanized longwalling was matched with a change to larger mine cars and the installation of surge capacity on the surface at Lancashire No. 15, Barnes & Tucker Co.

By HAROLD DAVIS, Associate Editor, COAL AGE

BETTER FACE OPERATIONS backed up by better coal handling from the face to the cleaning plant are solid footings laid down by Barnes & Tucker Co., Barnesboro, Pa., as underpinning for the company's activities in today's coal business. A pay-off switch to continuous mining in some sections and to mechanized longwalling in others at Lancashire No. 15 mine highlight the improvements in face methods. In transportation, the company is in the process of converting to larger mine cars to profit from the recognized advantages of high capacity in fewer units.

On the surface, new dumping, storage and rough-cleaning facilities have been installed to promote smoother transfer of the coal and to make the mine and plant independent of each other in the event either should suffer an interruption in operations.

These are the most recent of a long list of major Barnes & Tucker achievements designed to keep the company running with the leaders. Like the others, these new developments are sparked by R. T. Todhunter Sr., president of the company. Mr. Todhunter is a veteran of 67 yr in the coal industry who heartily subscribes to the principle of keeping abreast—and sometimes ahead—in moves toward increased efficiency. The "mother belt" is one of his innovations. General manager is R. T. Todhunter Jr., who in addition to his other duties has lived with the company's longwalling studies from the outset and has made a success of them.

With 265 men and supervisors engaged in underground operations, Lancashire No. 15 mine now is producing about 2,850 tpd, raw coal. Cleaning-plant reject is about 11% of the feed.

MODERNIZED SURFACE UNITS

The new surface facilities, designed and erected by the Penn-Wood Mfg. Co., Mt. Pleasant, Pa., include a 1,000-

ton storage bin, a new rotary dump, equipment for raw-coal screening, crushing and hand-picking, and two belt conveyors for transporting coal from the dump hopper to the storage bin and from the rough-cleaning units into the preparation plant.

The rotary dump is built to accommodate one of the new 8½-ton all-welded mine cars, also built by Penn-Wood, or two of the older 3-ton cars. The new cars—Barnes & Tucker now has 60, with others to be delivered—are equipped with Willison automatic couplings and National Malleable NC-1 mine-car trucks to make it unnecessary to uncouple while dumping a trip and to keep car maintenance to a minimum. The cars are 21 ft long, 6 ft wide inside and 40 in high, above the rail.

The mine cars are pushed into the rotary dump by a chain-type feeder, and each car is positioned for unloading by a shop-made carstop which is raised and lowered hydraulically to engage the following car. The dump itself has a positive drive at each end to eliminate torsion stresses that might develop with a single rack-and-pinion arrangement, and is equipped with a Cutler-Hammer brake.

The coal is dumped into a 60-ton hopper supported in a concrete vault under the dump floor. A Syntron vibrating feeder places coal from the hopper onto a 42-in belt conveyor which elevates it to the top of the 1,000-ton raw-coal storage bin. A diversion chute at this point opens a by-pass for boney or other mine wastes.

A distributing scraper conveyor over the top of the elliptical storage bin deposits the coal evenly in the bin. Four feeders under the bin discharge the stored coal onto a Syntron vibrating screen which splits the raw coal at 2½ in. The minus 2½-in through-product of the vibrator is laid directly on the 42-in plant-feed belt conveyor, and the plus 2½-in is hand-picked, crushed to minus 2½ in in a 30x60-in single-roll McLanahan & Stone crusher and laid onto the plant-feed belt with the minus 2½-in raw coal. These new units by-pass the original dump and plant-feed conveyor which were used with the smaller mine cars.

The new plant-feed belt discharges into a 150-ton storage bin at the top of the combination wet-and-dry cleaning plant, a Roberts & Schaefer installation featuring a Hydroseparator for cleaning 2½x½-in coal and four Super Airflow cleaners for ½x0, as described later in this article.

Surface operations have been sharpened up in a number of other ways, as follows:

1. All trolley lines are suspended from steel gantry frames and semaphore-type standards set in concrete to eliminate a great deal of maintenance on overhead lines. Smoother surface haulage is the result.

2. A new bin for traction sand has been installed at the drift mouth. Dried sand is dumped into the bin directly from delivery trucks and the locomotive operators fill up through a hose leading to the bottom of the bin. Handling and rehandling of traction sand is eliminated.

3. Shop facilities for the large mine cars are rapidly nearing completion. The mine now has a well-equipped electrical shop and a complete mechanical-repair shop, both on the surface.

UNDERGROUND IMPROVEMENTS

The workings are in the 42-in Lower Kittanning seam, a low-volatile coal used mainly for steam-raising. The top 5 to 8 in of the seam is a boney coal which is left in place to form the roof. The main roof consists of gray and sandy shales and is generally strong. The bottom is interbedded fireclay and boney bands. The raw coal averages about 8% ash and 2.1% sulfur.

The original mechanization of the mine was through the use of conveyors, and later the adoption of the mother-belt idea to increase the efficiency of conveyor

NEW 1,000-TON STORAGE BIN in the rough-cleaning plant is a surge cushion between mine and cleaning plant.

HIGH-CAPACITY MINE CARS, with automatic couplings and modern gear, reduce haulage labor and loading delays.

DRY TRACTION SAND is dumped into this bin by delivery trucks to supply locomotives. Rehandling is eliminated.

NEW ROTARY DUMP discharges into 60-ton hopper which feeds 42-in belt conveyor transporting raw coal to storage. Distributing conveyor (right) deposits raw coal in 1,000-ton bin to feed screening, picking and crushing units.

UP-TO-DATE SURFACE FACILITIES include a mechanical repair shop for major repairs and overhauls (left), an electrical shop for repairing and winding AC and DC motors, and well-built substations (right) to supply 275-v DC.

CONTINUOUS-MINING MACHINES, with two shuttle cars, drive rooms 18 ft wide in advancing 80 to 100 ft per shift. Shuttle cars discharge to 30-in panel belts which load into mine cars. Crews consist of seven men including the boss.

FEWER LOADING DELAYS are one major benefit resulting from the change to these larger, all-welded mine cars.

POSTS ON 4-FT CENTERS support the 5 or 8 in of boney which is left in place. Line curtain is hung on rib row.

mining. Then as equipment for low-coal operations became available, Barnes & Tucker converted four sections to conventional mechanized mining with loading machines, shuttle cars, top-cutting machines for working under the boney, and electric drills.

In continuous mining, the company has three units using Joy machines, and two Model 76-A Colmols, the most recent additions to the company's list of face equipment.

A full description of the longwall methods, authored by R. T. Todhunter Jr., appears in *Coal Age*, December, 1952.

In reporting on the performance of the newly-acquired Colmols, Mr. Todhunter Sr. says that 47 large cars from a 7-man crew (including the faceboss) is the record production in a single shift to date. The average is about 300 tons per unit shift.

Room-and-pillar mining is the accepted system of recovery. A room panel normally is 700 ft wide and from 1,600 to 2,000 ft long. Panel entries are driven through the center of the block, as shown in the map, and rooms are worked out on one side advancing and on the other side retreating. Panel-entry pillars are recovered with room pillars on retreat.

In conventional methods, rooms are driven 36 ft wide on 60-ft centers. In Colmol operations, rooms are 18-ft wide on 50-ft centers. Development openings are 16 ft wide.

The Colmols work a double-pass pattern, making 9-ft-wide cuts side by side to get full room width. The unit works a 40-ft advance then retreats 20 ft to work the parallel cut 40 ft. The 40-ft advances are offset 20 ft.

On Jan. 5, 1954, when the 47-car record was set, the machine advanced an unusually-long room from a starting length of 250 ft to a final length of 360 ft, measured from the shuttle-car discharge station at the panel belt, and also opened a 27-ft-long crosscut. Two shuttle cars, a Joy 6-SC and a Lee-Norse, provided transportation from the face to the 30-in panel belt, which discharges into mine cars at the butt-entry loading point. The average advance in Colmol operations is from 80 to 100 ft per shift.

Pillars are taken open-ended, although a 6-ft-wide fender is left to control roof breaks after each two or three open-end slabs have been removed. A large percentage of the pillars is pulled clean and caves are close to the pillar line. Further roof support in addition to the feeders is provided by posts on 4-ft centers, except in the area required for 12-ft-wide shuttle-car runways.

Kennametal cutting bits inserted into bit blocks are used on the digging arms to permit changing individual bits as necessary. Complete sets of bits are changed twice a week or after about 5 shifts, according to George Dunchuck, mine superintendent. Bit costs have been materially reduced since this change to cutting-machine bits was made.

Barnes & Tucker Management

Main Office, Philadelphia, Pa.

John Barnes Mull, Chairman of the Board
John R. Young, Vice President
H. H. Hamilton, Vice President
F. P. Roberts, Secretary-Treasurer

Operating Office, Barnesboro, Pa.

R. T. Todhunter Sr., President
R. T. Todhunter Jr., General Manager
Isadore Wesner, Chief Engineer
M. V. Mehal, Safety Director
John S. Todhunter, Engineer

Lancashire No. 15 Mine, Bakerton, Pa.

George Dunchuck, Superintendent
John O. Gill, Master Mechanic
Lewis Robbins, Mine Electrician
George T. Atkins, Chief Electrician
William Birchall, Plant Superintendent
Joseph Sherwin, Tipple Foreman
Daniel Yonkoske, Construction Foreman

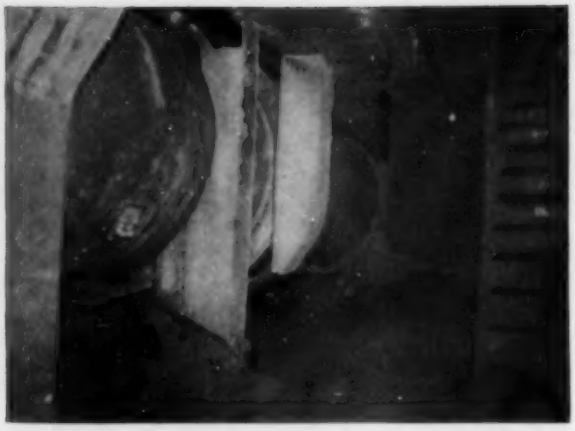
LANCASHIRE PREPARATION

The hand-picked coal as it enters the cleaning plant averages 8% ash and 2.10% sulfur. Clean coal averages 6.8% ash and 1.55% sulfur.

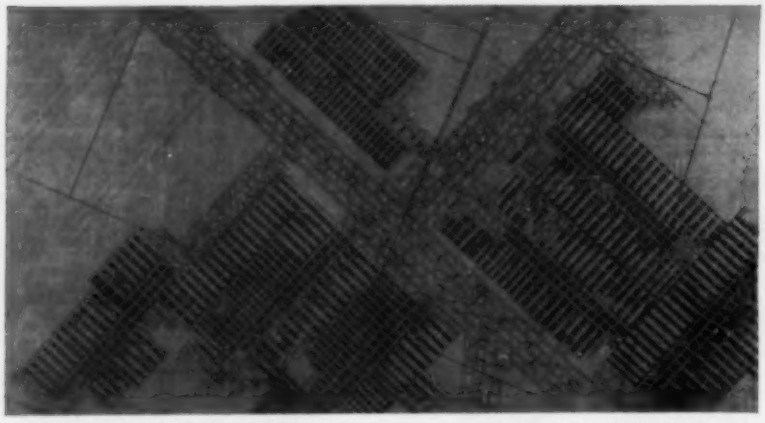
Unusual features include the drying of settling-tank sludge in a rotary-kiln-type drier to increase the yield of powdered fuel (½x0). Here is a description of the cleaning flow.

Four vibrating feeders transfer raw coal from the 150-ton storage bin in the plant onto four Allis-Chalmers vibrating screens which make a separation at ⅛ in. The 2½x⅛-in overproduct of the four screens is conveyed to the Hydroseparator, and the minus ⅜-in material from each screen is fed to a separate air cleaner. The raw-coal feeding rate to the No. 1 cleaner is adjusted to permit the handling of 20 tph of middlings from the air-cleaning units. Each of the four units receives about 54 tph. Minus 10M fines are screened out of the middlings and discarded before the middlings product is recleaned. The ⅜x0 clean coal is directed to the clean-coal conveyor for direct loading or blending with other sizes.

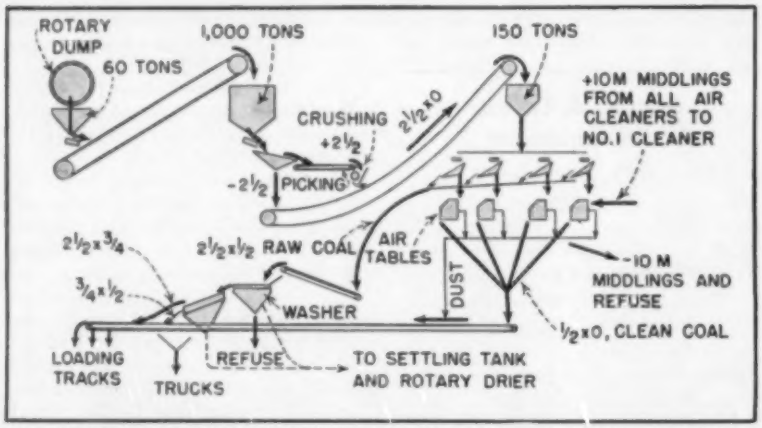
THREE LOADING TRACKS permit simultaneous loading of a prepared size and either slack or powdered fuel.



ROTARY DRIER produces 40 tons per shift of dried fines recovered from the wash-water settling tank.



OFF-TRACK FACE EQUIPMENT served by modernized track haulage contributes to productivity of better than 10 tpd per underground man in 42-in coal.



GREATER STORAGE CAPACITY in surface bins which reduces haulage delays is a necessary link between highly-mechanized mine and cleaning plant.

Four Raymond cyclone dust collectors precipitate about 21 tph of fines which may be loaded with clean coal.

Coarse coal is washed in the Roberts & Schaefer Hydroseparator, then dewatered and sized on a double-deck screen which produces 2½x¾-in nut coal and ¾x⅜-in pea coal. These products also are directed to the 2-compartment clean-coal conveyor for loading or blending with other fractions. Three loading tracks are available, one for loading nut coal, another for pea coal or powdered fuel and the third for powdered fuel, slack or nut-and-slack.

The plant produces ½x¾-in pea coal; ¾x2½-in nut; ¾-in slack, the largest fraction; ½x0 powdered fuel, next largest fraction; and 2½x0.

The plant operates on a closed water circuit, which makes it necessary to have some provision for removing solids from the recirculating wash water. The Barnes & Tucker solution is contained in a sludge-drying circuit, which, in addition to furnishing clarified water for the washing process, contributes about 40 tons per shift of dried fines that are loaded with the air-cleaned powdered fuel.

The key unit in this sludge-drying circuit is a 4x14-ft (nominal) Hardinge rotary drier. The circuit operates as follows:

Process water from the clean-coal dewatering section of the Hydroseparator is pumped to a settling tank where makeup water for the washer is clarified. Settled fines are discharged by the bottom conveyor of the settling tank to a pair of Allis-Chalmers dewatering screens operating in series. The dewatered sludge is fed to the rotary drier, and the drier product is elevated to the clean-coal conveyor directly. Spray water containing fines from the double-deck sizing screen also passes through this circuit.

Tests show that moisture content at several steps in the process is as follows:

Raw sludge	30.9%
First-screen product	29.1%
Second-screen product ..	23.0%
Rotary-drier product ...	0.5%

Hot gases for the drier are provided by two bin-feed stokers fueled with spillage which is cleaned up along the loading tracks. About 2 tons per shift does the job.

AT NEWLY MODERNIZED MEXICAN MINE, 36-in slope belt delivering coal to the surface is one of 91 conveyor units providing all-conveyor haulage from face to railroad car.

Developing a Mexican Coal Mine

American-engineered program modernizes coking-coal property with all-conveyor haulage, up-to-date power-distribution system and new plant to clean high-ash output.

By W. H. LESSER, Mechanical-Electrical Engineer, Pierce Management, Inc., Scranton, Pa.

AMONG the recent prominent mining projects in Mexico is the modernization of the Sauceda bituminous coal mine, a 2,000-tpd operation which employs conveyors from the working face to the railroad car and has adopted a special mining method designed to suit a very bad roof and other adverse mining conditions. A cleaning plant to prepare coking coal from a difficult-to-clean seam and a modern electric-power distribution setup that includes full sequence control of the entire conveyor system are other highlights of the new installation.

The Sauceda property was developed by Pierce Management, Inc., for the Carbonifera Unida de Palau, S.A., Palau, Coahuila, Northern Mexico. It is managed by the Altos Hornos de Mexico, S.A., Monclova, Mexico, the location of the company's recently constructed steel plant which is supplied with coal and coke by the mining company. It is one of the many developments in Mexico financed by the Export-Import Bank through loans guaranteed by the Mexican government.

The project included the engineering accompanying the design and construction of a slope and a shaft, a coal-cleaning plant, pumping plants, a sequence-controlled conveyor mine-haulage system, a compressed-air plant and an underground electric-power distribution system, which is of primary importance because the mine may become gassy and dusty in the future.

Since mining is now in the upper mining areas, the hazards from gas and dust are not serious at the present

CLEANING PLANT reinforced concrete was designed to efficiently handle the difficult job of turning a friable high-ash R-O-M into acceptable coking coal.

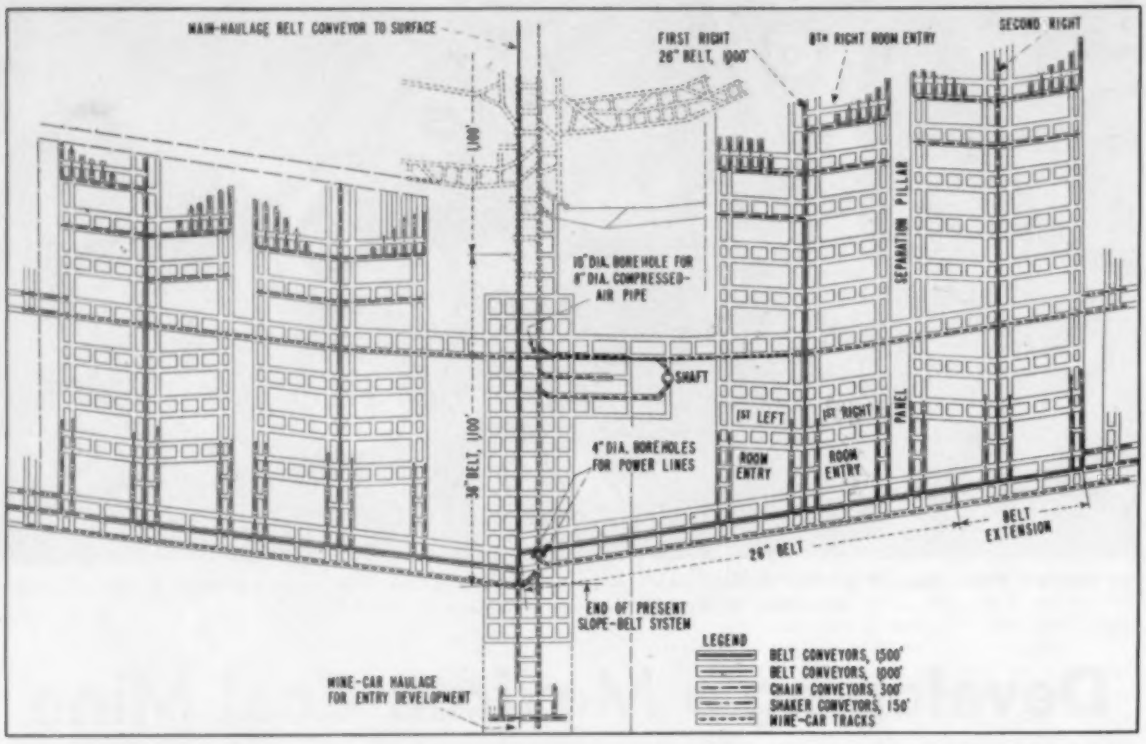


FIG. 1—SAUCEDA MINING PLAN incorporating pickhammer mining and all-conveyor haulage. With more development and changes in mining conditions, rooms now are driven 12 ft wide and 300 ft long, with 30-ft pillars.

time, but they will, no doubt, become more serious in deeper areas. Other operating deep mines in the Sabinas Basin are extremely gassy and similar conditions may be reasonably expected to develop in the Sauceda mine. In addition to the engineering projects, Pierce Management, Inc., also purchased and procured the required equipment in accordance with its specifications.

The mining company has mined a coking and steam coal for many years from the well-known Sabinas Basin. Since, however, production from its No. 5 Mine has ceased, the Sauceda mine was developed to obtain a new source of coal capable of producing eventually an annual R-O-M tonnage of 750,000 metric tons, which will be beneficiated in a cleaning plant. Also, to meet the demand for metallurgical coke, part of the cleaned coal is further processed in existing beehive coke ovens.

ROOM-AND-PILLAR MINING

In its property the mining company has coal reserves of 54,478,000 metric tons, of which about 11,958,000 tons is to be mined in the Sauceda slope. The property has one workable coal seam which averages 5 ft thick, with a dip of 4½ deg. The coal is friable, the roof weak, and a refuse parting in the seam contributes to a high-ash product requiring beneficiation. Overlying the coal seam, but near the surface, is a water-bearing gravel stratum which makes mining the coal near it difficult.

The mine has two main openings: a 3-heading slope 3,400 ft long and a circular concrete-lined shaft 13 ft in diameter and 264 ft deep. The room-and-pillar mining method as first proposed is shown in Fig. 1. As the mine became more developed and mining conditions changed, the plan was revised so that rooms now are driven 300 ft long and 12 ft wide, with 30-ft pillars.

Since the coal is friable, it is mined with compressed-air pickhammers, two pickhammers and two men in each room. Coal is handloaded onto chain or shaker conveyors, which discharge into belt conveyors delivering coal to the surface. Several coal-cutting machines are used advantageously to expedite development work.

Mining by pickhammers and conveyor haulage superseded handpick mining and a mine-car transportation system which included wheelbarrows between the face and mine cars when seam thickness became too thin to permit taking cars to the face, a mule-haulage system to the slope bottom and slope haulage to the surface where the hoist was located. A substantial increase in production per worker already has resulted from the new method of mining, and a further increase is expected when the workmen become more accustomed to it.

MINE POWER GENERATED

Electric power for the entire mining property is generated in a modern steam-turbine electric-power plant equipped with one 2,500-kva generator, 80% power factor, 3-phase, 60 cycles at 2,400 v. Steam for the turbine is generated in a package boiler plant using spreader-type stokers. Water for steam generation is obtained from wells, but its quality is such that a feed-water treating plant is necessary to prevent formation of scale in the boiler. Cooling water for a condenser with 2,000 sq ft of surface is obtained from a spray pond.

A nine-panel switchboard provides the switching facilities required by the generator and outgoing circuits. The complete instrumentation of switchboards and boiler results in a modern, isolated mine power plant. This plant supplemented an old generating station from which emergency power may be obtained.

A stepup substation at the power plant supplies 23,000 v to the transmission lines connecting the Sauceda

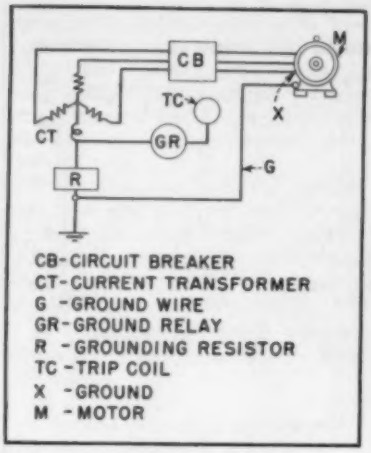


FIG. 2—FULL PROTECTION of men and equipment is the objective of this 4-wire 3-phase grounded-neutral AC circuit used on all underground motors. Starters and motors are explosion-proof type.

SURFACE CONVEYORS permit either discharge of mine output into railroad cars for haulage to cleaning plant or storage in area when plant is not operating or cars are unavailable. Carbonifera Unida de Palau, S. A., officials shown are G. Lopez (left), mine superintendent; J. J. Gonzales, general superintendent; and J. Heitz, manager; with A. H. Kamphaus (right), resident engineer for Pierce Management.

mine and the No. 5 mine. Stepdown substations, 23,000 to 440 v, at the mouth of the Sauceda slope and the top of the shaft supply power to the underground circuits and to a compressed-air plant on the surface at the shaft top. The substations are of the conventional outdoor steel-structure type, equipped with single-phase transformers, high-voltage horn-gap air-break switches, high-voltage power fuses, lightning arrestors, electrically operated low-voltage air circuit breakers and ground grid assemblies.

COAL CLEANING DIFFICULT

The reinforced-concrete coal-cleaning plant built to clean the R-O-M product loads into railroad cars on two tracks, one for boiler fuel and the other for coal going to the coke ovens. Cleaner rejects are trucked to a nearby disposal area. Process water is obtained from wells. Overflow water from the recirculating sump and water from the refuse conveyor flows at 100 gpm via a ditch to an old shaft.

Plant operation has proved that the R-O-M is difficult to clean because: (1) over 30% has a specific gravity between 1.45 and 1.65; (2) the coal seam is laminated with a high-ash boney material; (3) the coal is friable and therefore breaks into a high percentage of small sizes, with over 20% below a 10M; and (4) a further increase in fines results when lump is crushed to free boney material. The preparation method following has been adopted as a result of these R-O-M characteristics and the necessity for producing a low-ash coking coal.

After screening out the 2x0 to permit hand picking the plus 2-in fraction on a picking table, the entire product goes to a diaphragm jig serving as a roughing jig. The coal product from the jig is screened into three sizes: 2x⅜ high-ash boiler fuel; ⅜x$^{3}/_{16}$ coking coal; and $^{3}/_{16}$x0 which is further beneficiated by 12 concentrating tables. Middlings and refuse from the jig are discarded because of the high ash content.

At present 30% of the cleaned product is shipped as boiler fuel. When the demand for coking coal increases, however, it will be supplied by crushing the 2x⅜ cleaned fraction (boiler fuel) to minus $^{3}/_{16}$ and adding a third compartment to the existing jig, thus making it possible to reduce the ash in the boiler fuel to make it acceptable as a coking coal.

These results have been obtained in the cleaning plants:

	Per Cent Ash
Raw feed (R-O-M) to the cleaner, plus 2x0	32.0
Clean boiler fuel, 2x⅜...	19.5
Clean coking coal, $^{3}/_{16}$x0..	14.5
Refuse	65.0

It is anticipated that the demand for coking coal will replace ultimately that for boiler fuel, and the entire product from the plant then will be shipped as $^{3}/_{16}$x0 coking coal with an ash content not exceeding 15.5%.

POWER SYSTEM STRESSES SAFETY

Underground, all motors are supplied with power by a 4-wire grounded-neutral system. Since the station transformers are delta-delta connected, the grounded neutral (fourth wire) is obtained by using grounding transformers inside the mine. This system offers greater safety to operators in case an equipment ground develops. By the use of current-limiting resistors and ground trips, the ground current is limited to around 10 amp, and the damage caused by an insulation failure thus is less than that caused by the current required to trip line circuit breakers set for several hundred amperes.

Fig. 2 shows a 3-phase, 4-wire, grounded-neutral circuit incorporating the protective features described above. To obtain the maximum safety for men and equipment, the motors and starters are of the explosionproof type.

The self-supporting aerial power cable used in the Sauceda slope contains four single-conductor cables, all bound to a Copperweld messenger by copper tape. Each cable is made in accordance with the classification of the Insulated Power Cable Engineers' Association, and USBM standards for flame-resistant cables.

Sectionalized 4-conductor cables are used in strike entries, panel entries and room entries. Their use in panel and room entries eliminates the necessity of opening a cable and making splices when a conveyor is moved to a new location. Polarized connectors at each end of the cable sections and load centers facilitate making connections and avoid incorrect connections to equipment, sometimes the cause of expensive repairs.

To obtain adequate protection for power circuits, equipment and personnel, safety circuit centers were

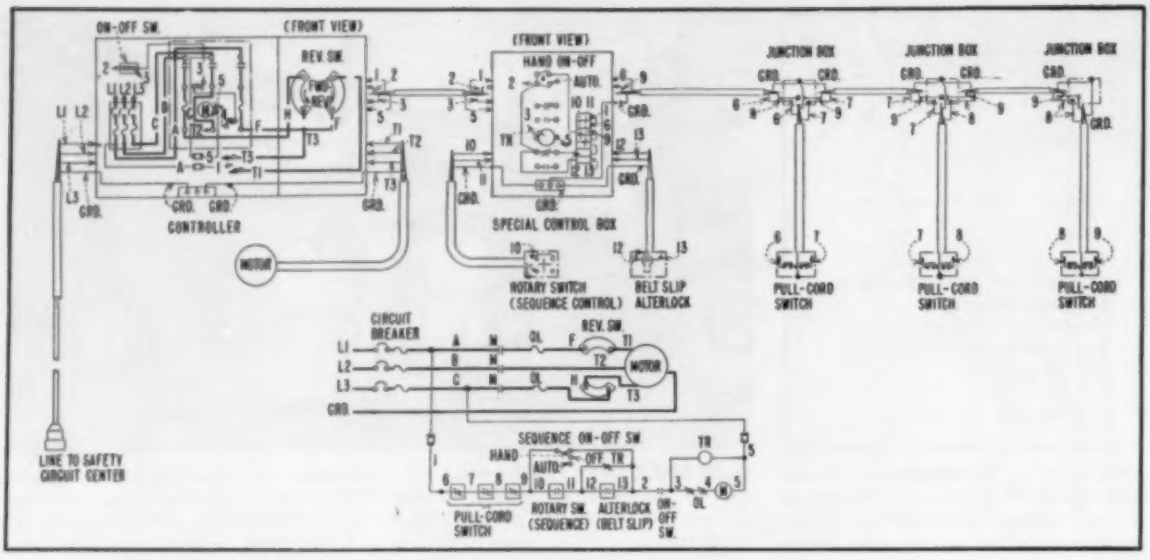


FIG. 3—WIRING DIAGRAM for a sequence-controlled motor. Also included are pull-cord control along belt line, belt-slippage protection and provision for manual operation.

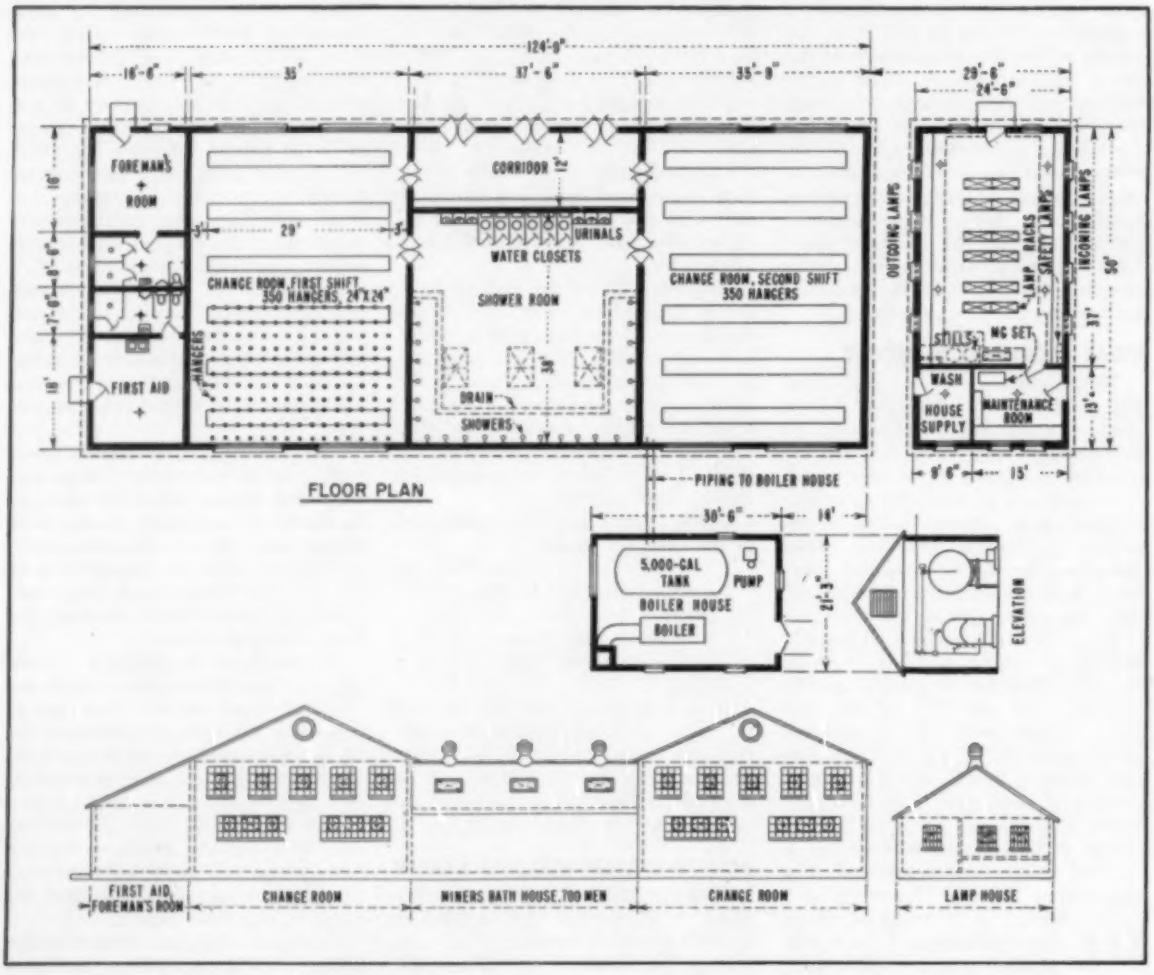


FIG. 4—MODERN BATHHOUSE features foremen's change room, first aid room and lamp house.

provided as follows: one with four outlets at the outby end of each strike entry; four with two outlets at the outby end of each panel entry; eight with two outlets at room entries; and 24 two-outlet explosionproof gang boxes in rooms.

When the mine is in full production, the safe distribution of power by adequate circuit breakers, the protection of motors and equipment, ground-fault protection and sequence control require the following:

14 safety circuit centers with circuit breakers of capacities from 40 to 225 amp.

24 gang boxes.

3 neutral grounding transformers.

6 special control boxes.

6 rotary switches for belt-slippage protection.

30 pull-cord safety switches.

8 junction-box assemblies.

16 rotary switches for sequence control.

MINE OPERATES 91 CONVEYORS

The underground haulage system consists of belt, chain and shaker conveyors. The top belt conveyor in the slope, discharging to the surface, has a capacity of 350 tph. As shown in Fig. 1, conveyors required to transport the ultimate mine production are:

No.	Type and Size	Location
1	36-in belt, 1,750 ft long	Slope
2	36-in belt, 1,100 ft long	Slope
2	26-in belt, 1,500 ft long	Strike entries
2	26-in belt, 1,000 ft long	Strike entries
4	26-in belt, 1,000 ft long	Panel entries
20	15-in chain, 300 ft long	Room entries
60	42-in shaker, 150 ft long	Rooms
Total conveyor units 91		

FULL SEQUENCE CONTROL

The sequence control of the mine's conveyor system consists primarily of interlocking the control of each conveyor unit so that the system, actuated by push-button controls, will start and stop the individual units in the proper sequence. When the system is started at the beginning of a shift, the last outby conveyor section starts first, followed by the other conveyors one after the other. When the system is stopped at the end of a shift, the last inby section stops first, with the others following in order. As a result, no conveyor will discharge its load into another conveyor unless it is in operation.

A typical wiring diagram for a conveyor motor (Fig. 3) includes these features:

1. Pull-cord switches permitting starting and stopping the system by a pull cord suspended over the conveyors. This feature not only provides for control by a traveling attendant at any point along the belt when necessary but also avoids serious equipment damage from roof falls on the belts since a fall will hit the pull cord first and stop the system.

2. Alterlocks, designed to stop the system if belt slippage occurs, a condition that also could be the possible cause of a mine fire.

3. Rotary switch for sequence control.

4. Reversible switch.

5. A sequence on-and-off switch to take a conveyor out of sequence control for hand starting and stopping as necessary when making conveyor repairs.

Room shaker conveyors and room-entry chain conveyors are stopped by sequence control, but not started by it. They are manually started and stopped by the facemen, with starting possible only when the entire conveyor system is operating.

Sequence control of belt conveyors in the slope is similar to that in entries and both are tied together, thus resulting in a complete sequence-controlled haulage system.

VARIED FACILITIES INSTALLED

R-O-M storage facilities have been provided at the slope mouth to permit operating the mine in periods when the cleaning plant is not operating, railroad cars are not available or production exceeds the demand.

Coal from the mine is discharged by the 36-in slope belt conveyor into a revolving chute capable of diverting it either into bins for loading into railroad cars for transportation to the cleaning plant or onto a belt conveyor for discharging at the bottom of a stacker boom. Using a bulldozer to spread coal over an extensive area materially increases the plant's storage capacity.

To supply compressed air needed to operate the pickhammers and other air-consuming equipment, three air compressors were supplied. They have a total piston-displacement capacity of 5,514 cfm at a delivered pressure of 100 psi. Use of air receivers, air filters and aftercoolers result in a modern mine compressed-air plant.

As a second outlet for ventilation, a shaft was sunk, 13 ft in diameter and 264 ft deep. It will be served by a 75-hp hoist to hoist men during an emergency. Normally, the men walk up the Sauceda slope.

To supply the mine with sufficient air, a 72-in Aerodyne mine fan, with a capacity of 190,000 cfm at 3½-in water-gage, was installed and connected to the top of the shaft. A steel airlock equipped with explosion doors will be built over the shaft top to permit hoisting of men or cars without interfering with ventilation.

For dewatering the Sauceda slope, a mine pumping plant was designed for installation in the No. 3 South gangway. It contains two 800-gpm centrifugal pumps, 205-ft head, discharging to the surface through a borehole. One pump is provided with an automatic control which, by a selector switch, could be transferred to the other pump. During periods of normal water, automatic pumping thus can be obtained, while in flood periods, when manual supervision is possibly necessary, both an automatically operated and a manually operated pump are available.

Among the several buildings designed for the property is a bathhouse that includes a foreman's change room, first aid room and lamp house, Fig. 4. All are built of brick with corrugated roofs.

Officials of Carbonifera Unida de Palau, S.A., who, together with A. H. Kamphaus, resident engineer for Pierce Management, Inc., participated in development of the mine, include: J. Heitz, manager; J. J. Gonzales, general superintendent; G. Lopez, mine superintendent; and F. Landois, chief clerk.

Equipment for the mine was supplied by the following:

Power plant, circuit breakers, motors, Westinghouse Electric Corp.

Substations, General Electric Co.

Slope belt conveyors, coal-storage plant, Barber-Greene Co.

Entry belt conveyors, safety circuit centers, Joy Mfg. Co.

Chain conveyors, jigs, fans, Jeffrey Mfg. Co.

Shaker conveyors, Goodman Mfg. Co.

Cable, including aerial power cables, Hazard Insulated Wire Works.

Air compressors, pickhammers, Ingersoll Rand Co.

Mine pumps, Barrett, Haentjens Co.

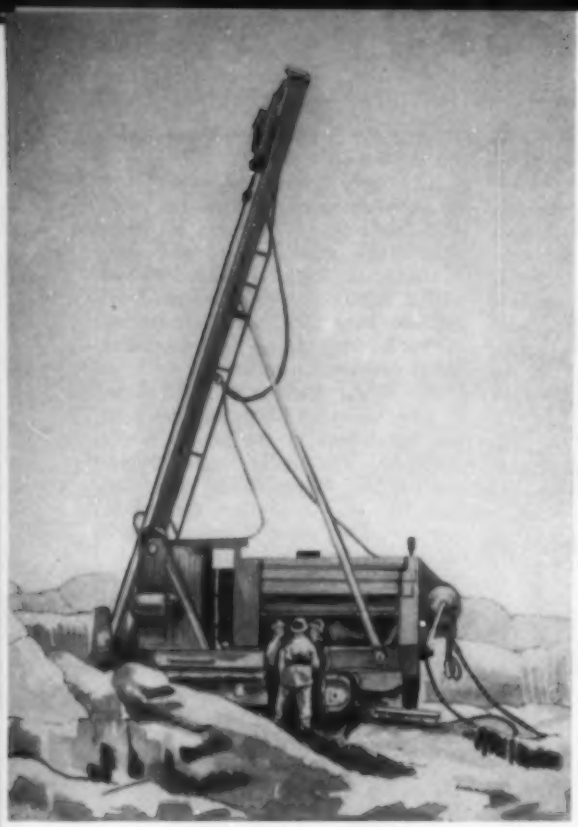
Electric cap lamps, Mine Safety Appliances Co.

Screens (Niagara), W. S. Tyler Co.

Concentrating tables, Deister Concentrator Co.

Load-distribution center and control bench in coal cleaner, Cutler-Hammer, Inc.

Coal-cleaning plant, Allen & Garcia Co.



A Fable...

What Might Have Been In Steep Pitch Mining

If today's tools and equipment had been available 100 yr ago, when steep-pitch mining began, what methods would have been used by the old timers?

IN THINKING ABOUT THE PROBLEMS of mining steeply-pitching veins, one is led to wonder whether our present practices would have been adopted if today's tools had been available to the industry back in the early 19th century when the old timers first went underground. Histories of the region tell how the early operators removed as much coal as possible from the surface, until their stripping ratio defeated them. Quite naturally, then, they resorted to sinking slopes from which coal gangways were driven along the strike of the vein. And as a last resort, they turned straight up.

Even though our 20th-century stripping equipment had been available then, the anthracite industry would have been forced into deep mining to provide enough coal for the growing nation. But would they have mined as they did if today's equipment had been available?

Let's transport ourselves backward in time 100 yr or more to see what is going on as some canny old timers put our tools, or tools we could devise, to work.

A decision to go underground has been made, and a slope has been sunk on the 60-deg dip of a 7-ft-thick vein. Using drilling jumbos and carbide-tipped drill bits, the workmen turned a water-level opening from the foot of the slope back through the bottom rock and advanced a distance of 60 ft. Then they turned gangways from this point and advanced through the bottom rock along the strike of the measures, maintaining their drainage grade as they advanced.

Tap-holes were driven 40 ft apart on an inclination of 60 deg through the bottom rock from the gangway to the vein. In providing ventilation for these operations, the old timers carried an airway through the coal, intersecting the tap-hole openings in the vein. This airway was driven 20 ft each way from each tap-hole opening, both 20-ft sections inclined at 45 deg and meeting the airway sections driven from adjacent tap-holes. This was the full extent of underground development.

Now the men in charge of the work faced this problem: How to mine the coal above the airway?

The first suggestion was that men be hired to advance openings straight up the pitch, but this was ruled out because the work would be hazardous and the time involved in traveling and handling supplies in the near-vertical openings would be excessive to the point of severely limiting productivity.

It was suggested next that a machine be devised which would crawl up the pitch, mining as it went and dropping the broken coal down the pitch to a loading point in the gangway. But it was felt that (1) the cost of such a machine would be astronomical and (2) there could be too many vexing problems in its design, development and operation, considering the limited number that could be used in the region.

Next suggestion was that extremely long holes be drilled upward in the coal from the airway and that the coal be blasted down by charges strategically placed in these holes. This looked good, but it was held in abeyance until a fourth option could be given a trial.

The fourth option required a return to the surface. An inclined drill was selected from among the several on the market and was used to drill 6-in holes from the surface down to the airway, following the dip of the vein. The plan called for detonating successive charges in these holes, beginning at the bottom and working upward to dislodge the coal in order that it might be drawn off at the tap-holes.

Initial relief was provided by drilling eight holes around the circumference of a 5-ft circle, with a ninth hole in the center of the circle to serve as a blasthole. Thus they created a free face for subsequent blasting. These patterns were drilled above the ends of both the east and west gangways and recovery retreated toward the slope.

Many problems were encountered as the work progressed.

Shooting was erratic because it was

difficult to confine the charges effectively in the holes. That is, until someone suggested that inflatable gaskets be attached to the top and bottom of the charge with small carbon dioxide cylinders providing the inflation medium. The cylinders were remotely actuated through separate lead wires tied to the lowering cable.

Shooting was further improved when someone recalled the effectiveness with which the power of a military shaped charge could be directed at a point. Therefore, a new-type charge was made in a shape similar to the wide pulleys used along slopes to train the hoisting rope properly. The concave curvature of the sides of the charge was such that the explosive forces would be concentrated against the coal.

One day a violent explosion accompanied the normal shooting. That was how the old timers learned that methane must be respected. They quickly changed to the practice of drilling two holes and mounting a high-capacity air pump at the collar of one while the other was used for blasting. Then they called for a remote methane indicator which they could lower into a blasthole to take periodic readings, and they laid that problem into the laps of manufacturers of such equipment.

Often it was difficult to determine how much coal had dropped away from the bottom of the hole. They turned that problem over to the makers of cameras, and soon they had a "photo capsule" which could be oriented at the bottom of the hole and which provided complete prints by the time the capsule had been retrieved from the hole.

Sometimes the holes collapsed, fouling the drill stem or making it necessary to drill a new hole. The use of oil-well casing in the holes solved this one. Of course, the casing had to be withdrawn progressively to permit placement of the charges.

But now the bits were of greater diameter than the casing, making it impossible to withdraw a bit after the hole had been drilled to the airway. Some of the old timers turned to the practice of permitting the bit to drop off the stem into the airway, from where it was recovered with the coal.

Others ordered a new-type bit with cutting elements mounted at the ends of fingers which were pin-connected to the body of the bit. This type passed through the casing like a clenched fist, then at the bottom of the hole the cutting elements splayed out like the fingers of an open hand. Both expedients served the purpose.

Underground the coal loaded itself into the transportation system provided by the designers of the mine. The shooting dropped the coal into the airway, it tumbled down through the airway and tap-holes, and passed through a feeder onto an extensible belt which fed a tandem main belt conveyor in the gangway. The main belts in the east and west gangways fed onto a cross-conveyor installed in the 60-ft-long access opening from the slope, and the cross-conveyor discharged into an automatic-skip loading hopper.

Only one tap-hole was active at one time in both gangways, and when excessive rock appeared the extensible belt was retracted to the next outby tap-hole.

Mining the next lower lift introduced a new set of problems. Here is how it was done.

The second level was fully developed as the first had been, with an access opening from the foot of the slope, east and west gangways, tap-holes and an airway in coal.

The blastholes to be used in recovering this lower lift were drilled from the upper level. Therefore, it was necessary to develop a drilling bench at the upper level. This was done by driving water-level rockholes on 100-ft centers from the upper gangway to the bottom rock of the vein, and then driving extensions of these through the coal to the top rock. The extensions were connected by a new airway in coal.

An inclined drill, specially designed to operate within the available space, was used to drill downward from each of these extensions in coal, with the solid coal between the drilling bench and the original airway above serving as a safety barrier.

The drilling pattern was fan-shaped, as viewed in the plane of the vein. All holes were drilled from the extension, making it unnecessary for the men to work in the airway after it had been driven. Their escapeway through the water-level rockhole always was close by. Furthermore, the men worked under a shield made of structural aluminum.

There was talk among the engineers to the effect that perhaps the lower lift might better be recovered by drilling holes upward from the lower level. They also were planning work schedules which would permit simultaneous recovery of the upper lift and development of the lower lift to provide a uniform rate of production. And they were considering the possibility of converting to a system of advancing recovery, but their big problem here was handling rock from development openings and coal from production openings at the same time.

Supplies were lowered into the mine in the skip and carried from the foot of the slope in off-track tractor-trailer units. Roof bolts were employed extensively. Electric power for the conveyors and drills was transmitted through 100-ft lengths of cable, and compressed air for removing drill cuttings from the holes and for rock excavation was transported in plastic pipe.

A number of kinks had to be worked out in the early phases.

There was the problem of proper spacing between blastholes. Proper timing between shots was critical in controlling the desired breaks in the top rock to prevent excessive dilution. Shooting had to be carefully balanced against draw-off at the tap-holes to compensate for swell.

Preservation of the large sizes was very important, but in this regard one of the men in charge was heard to say:

"Someday, somebody will figure a way to use these fines we reject. Then we'll be able to treat the coal rough, underground and on top. We'll beat it down so that nobody will have reason to be tempted to skim off the big sizes.

"And when we reach that point, we'll save the money we now invest in gentle handling, demurrage and getting rid of no-bill loadings. We'll be able to serve our market, and we'll price our product at its worth."

The staff included a mine superintendent, a mine foreman, a mining engineer, an assistant foreman and a fireboss in each gangway, an electrical engineer and a 3-man surveying crew.

Service labor consisted of the following:

Duty	No. of men
Ventilation	2
Maintenance	10
Supply-handling	2
Roof-bolting	4
Hoisting	1

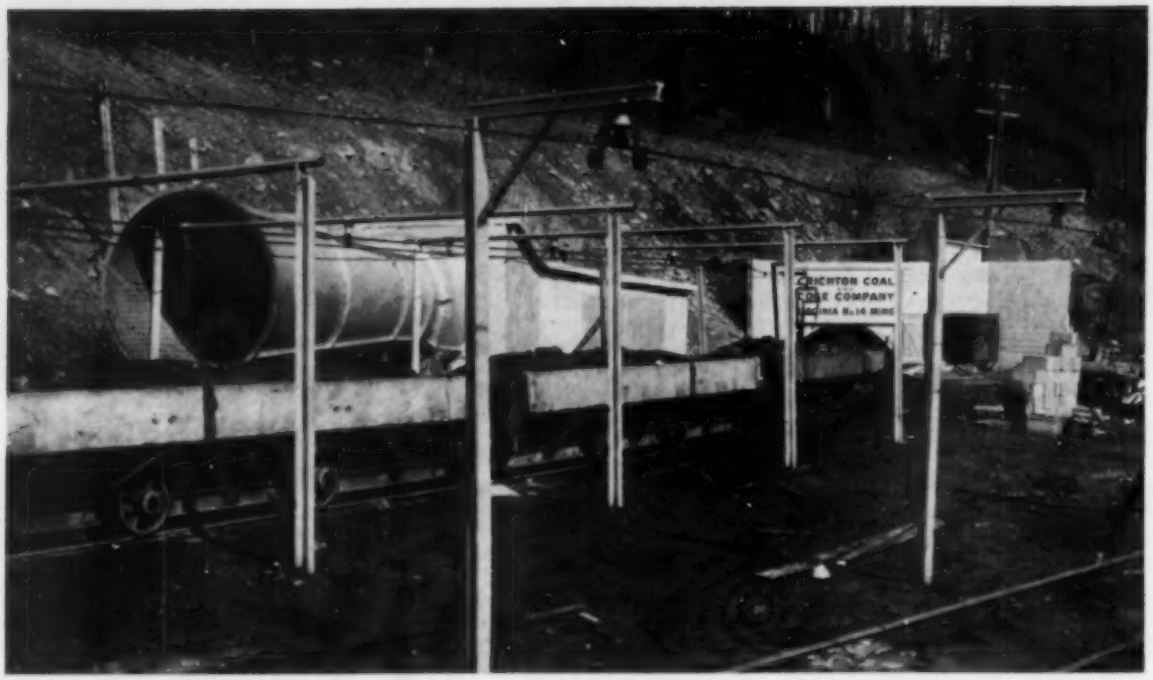
The working force also included 24 production employees. Rock-development crews consisted of a driller and helper and a mucking-machine operator and helper in each gangway. Airways were driven by four men on each side of the slope. Rounding out the production crew were two drillers and two helpers manning the two inclined drills, one over each gangway, and four blasting technicians, two on each side.

All told, there were 59 employees, including clerical help, storeroom attendant and so on. The production goal was 10 tons per man day.

Were they successful?

What were their relative costs?

We don't know—the picture becomes cloudy here.



CONCURRENT PRODUCTION AND REHABILITATION at Virginia No. 14 mine is the order of the day as newly-formed Crichton Coal & Coke Co. sets out to enter Central Pennsylvania coal in the running with competitive fuels.

Opening a Coal Mine Today

Crichton Coal & Coke Co.'s four steps:

1. **Recognize your competition.**
2. **Capitalize on coal's strong points.**
3. **Build an organization around experienced men.**
4. **Choose methods for high productivity.**

WOULD YOU TAP your own resources and your established credit to the tune of $500,000 or more to open a commercial coal mine in Central Pennsylvania right now? It is not a decision to be taken lightly; there is no blinking the fact that conditions in that area's coal industry may be described as austere.

Yet within the past year a new company has been formed to produce high-quality steam coals from the Lower Kittanning seam in Indiana County. Can such action be justified? Who did it? How?

Taking one question at a time, A. B. Crichton Jr., president of the newly-formed Crichton Coal & Coke Co., Johnstown, Pa., says the step is a reasonable one in view of the growing fuel appetite of the electric utilities, a tailor-made outlet for Central Pennsylvania's low volatile coals.

As to how you go about launching a project like this, Mr. Crichton lists the following steps:

1. Recognize your competitors. In this instance, competitive fuels at eastern power plants include foreign residual oil, lower-cost strip-mined coal, natural gas and coal from other mining districts. From a standing start, you've got to design your operation to fit into this competitive lineup.

2. Capitalize on coal's strong points. Proved reserves make it a dependable source of energy for years to come. But that is an industry-wide characteristic. If a new company is going to trade on that strong point, it must present itself at the market place with proved reserves in the ground and a respectable daily tonnage, thus assuring prospective customers of long-term dependability. Crichton Coal & Coke Co.'s mine, Virginia No. 14, is the key to a large tract near Heshbon, Pa.

3. Build an organization. The premium is on experience. General superintendent of the new company is C. C. Butcher, and Charles Turley is mine foreman. These two officials cooperated with Mr. Crichton in developing bridge-conveyor mining, the method now in use at Virginia No. 14.

4. Design for highest-possible tons per man at the face, then take all possible steps to control service labor to prevent losing the advantage. For example, there are certain fixed costs per $100 of payroll, such as compensation premiums and Social Security charges, that can be reflected in lower costs per ton only by getting more tons per $100 of payroll. That's elementary, but it must be recognized from the start as another compelling reason for aiming at a high tons-per-man figure.

CHOOSING THE EQUIPMENT

The Lower-Kittanning (B) seam in the vicinity of Heshbon, which is in the southeast corner of Indiana Coun-

DENSE-MEDIA CLEANING UNIT is the heart of this simplified plant which employs two operators per shift inside the structure.

UNATTENDED DUMPING from either of two tracks over raw-coal bin helps control service-labor needs in providing feed for the plant.

ty, averages 43 in in thickness. The roof generally is good and the bottom is fireclay. The mine was originally opened in 1924, and present mining is done from the existing openings toward the larger tract of solid coal. These conditions largely governed the selection of equipment.

The good roof makes wide work possible. Low clearance and bottom conditions might limit the effectiveness of complete off-track mining. Hence the choice of loading machines at the face, chain conveyors in rooms and belt conveyors in panel entries to meet the existing track. In tying this production line into a unit, the officials of the company turned to their old standby, the bridge conveyor, to connect the loading machine directly to the mine transportation system.

The loading machines are Joy 14-BU's, modified only to the extent of replacing the ends of the discharge booms with special adapters to accommodate the Long Piggyback conveyors. The adapters and the room conveyors also are furnished by the Long Co. The belt conveyors are 30-in Barber-Greene units.

Other face equipment includes Sullivan 7-B and Goodman 512 cutting machines with 9-ft bars, Schroeder hydraulic coal drills operating from an independent power source on a mounting attached to the T-2 machine truck, and an Airdox system for breaking the coal.

With high-capacity equipment at the face, a change to larger mine cars was in order, but modern mine cars represented a sizable investment at this stage. Therefore the company rents 60 Sanford-Day units from the manufacturer. These 5-ton, drop-bottom cars are dumped unattended at the cleaning-plant feed hopper, another instance of labor economy.

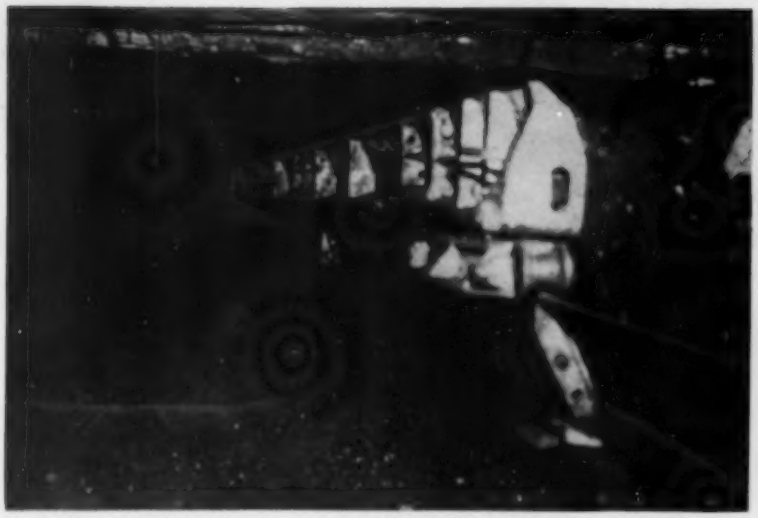
The cleaning facilities also were chosen to provide simplicity of flow and lowest labor requirements consistent with the job of converting a high-ash, high-sulfur mine product into desirable fuel. The core of the plant is a Daniels Dense Media washery which cleans 6x⅜ square material. One man per shift operates the washery and one man is stationed on the tipple. The washery produces coal running about 5 to 5½% ash and 1¼% sulfur. Fusion temperature of the clean coal averages over 2,500 F.

MINING THE COAL

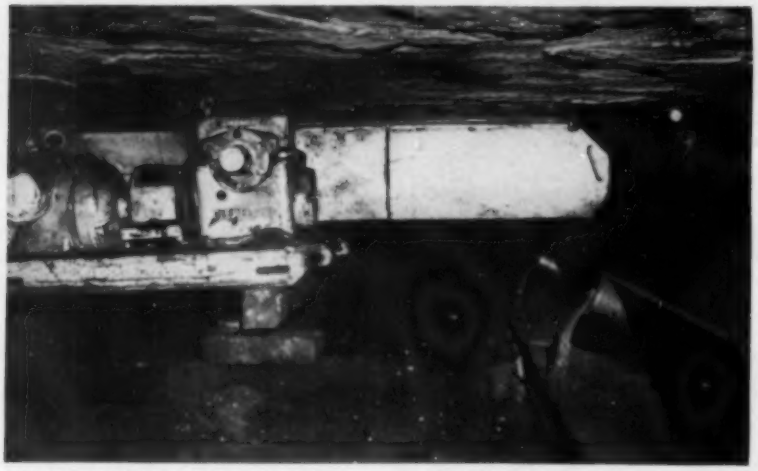
Room panels are 780 ft wide and 2,000 ft long, opened by driving four headings on 60-ft centers through the center of the panel to full panel length. The two inner headings are 28 ft wide and the two outer headings are 30 ft wide. The panel belt is installed in one of the inner headings on intake air.

Rooms are driven 45 to 50 ft on 60-ft centers both ways from the panel headings. The 60-ft center distance between the panel headings provides room for setting up the room conveyor with enough pans to handle the Piggyback unit.

A face crew consists of five men, a loading machine operator and a helper, a cutting-machine operator and a helper, and an Airdox operator. A crew of this size working two rooms achieves an average output of 150 tons per shift. Section personnel also includes a foreman, a boom man and a mechanic in the panel which is worked by two face crews.



BRIDGE CONVEYORS provide direct link between high-capacity loading machines and room conveyors in working 45-ft-wide rooms.



ROOM CONVEYORS discharge into 30-in panel belt. Rooms are driven in pairs by 5-man crews in recovering 780x2,000-ft panels

DROP-BOTTOM MINE CARS are loaded by an elevating conveyor which receives discharge of panel belt. The new mine employs 60 of these 5-ton units.

The cutting-machine operator and his helper also drill four, five or seven holes, depending upon the width of the place, for placement of the Airdox shells. The coal-breaking compressor is installed in a concrete-block cell at the drift mouth, and the high-pressure lines to the workings are hung from permanent roof plugs in accordance with state and federal recommendations. The Airdox installation has been made since the Crichton organization assumed management of the property.

Roof support consists of four rows of posts in rooms and two rows in the narrower entries.

The workings are concentrated to permit most economical distribution of power, which is supplied at 275 v DC by a 300-kw General Electric ignitron rectifier situated near the active workings. A new installation in a surface substation of a 300-kw General Electric rotary converter was completed and put into operation in March.

Some of the equipment now in use at the mine had been in service before the new management took over, including several of the loading and cutting machines. In all instances, these units were taken out and completely overhauled. Such rehabilitation of the 14-BU's and the change to bridge-conveyor mining has been reflected in fuller realization of the high loading rate of these machines. The idea was to get a fresh start with all face machines in top condition, since it was felt that the transportation system could handle any amount of coal the face crews could produce.

On the surface, the 3,500-ft-long tramroad from the portal to the tipple has been substantially rebuilt, surface trolley lines have been suspended from steel supports set into concrete piers and shop facilities are being brought up to date.

DENSE-MEDIA PREPARATION

One of the first problems the new company attacked was that of cleaning the coal. In selecting equipment for the job, the accent, as in underground operations, was on simplicity and labor economy as well as on effectiveness of cleaning.

"Since we are operating to produce coal primarily for the utilities market," Mr. Crichton says, "we can eliminate a lot of the equipment and costs involved in designing for minimum degradation between the face and the railroad car."

Taking advantage of the steep banks of Black Lick Creek to eliminate the need for an elevating conveyor in transporting raw coal to the top of

the cleaning plant, company management installed the plant-feed bin high on the bank with the plant lower down so that the elevation of the top of the plant is the same as that at the bottom of the bin. Therefore, the plant-feed belt conveyor is level.

As shown in the illustration, the drop-bottom cars are hauled across the top of the 160-ton bin on either of two tracks. The use of two tracks permits faster unloading when the level of the coal at one side of the bin is high, and also permits fullest utilization of bin capacity.

The coal is discharged from the bottom of the bin over a Syntron vibrating feeder onto the 30-in plant-feed belt conveyor which discharges to the double-deck primary screen at the top of the preparation circuit.

The plus 6-in-square overproduct of the primary screen can be economically rejected since it consists primarily of stronger high-ash, high-sulfur portions of the seam. The minus ⅜-in coal, which passes through the bottom deck of the primary screen averages about 7¼% ash and is loaded directly as ⅜x0 slack.

The 6x⅜ fraction from the primary screen provides about 25 tph of feed for the DMS Dense-Media washer. It is transported from the discharge end of the primary screen by belt conveyor to a 3x10-ft Allis-Chalmers prewet screen where it is conditioned under sprays before it is fed into the cleaning vessel.

The clean coal is carried directly to the discharge weir of the vessel on the magnetite-water suspension, 1.25, 1.26, 1.27 or 1.28 sp gr, and refuse sinks to be collected and raised out of the vessel by the refuse conveyor. Clean coal and refuse are fed to separate compartments of a 3x14-ft vibrating screen which serves as both medium-reclamation screen and dewatering screen.

A single 24-in Magnetic Engineering & Mfg. Co. magnetic separator recovers magnetite from the wash-water sprays installed over the medium-reclamation section of the 3x14-ft vibrator. The thickened magnetite is fed into the main sump of the cleaner to be recirculated through the vessel by the main pump. Effluent of the magnetic separator is pumped to a settling dam. A deepwell pump and storage tank above the plant elevation provide process water, and the clarified overflow of the settling dam also is used. A Heyl & Patterson cyclone thickener and Syntron wedge-bar dewaterizer are being installed to recover the low-ash sludge from the system.

The clean coal is split at ¾-in on a Syntron vibrating screen. If ¾x⅜-in pea coal is to be loaded on one of the two loading tracks, the 6x¾-in lump is by-passed through a crushing circuit to be reduced to minus ¾ in and loaded with slack on the other track. If lump coal is to be loaded, the pea coal is loaded in the slack car. A reversible belt under the crusher and sizing screen permits the use of either track for either size. The loaded cars may be shipped via the Pennsylvania R.R. or the Baltimore & Ohio. Shaw Coal & Coke Co., Philadelphia, Pa., headed by W. R. Shaw, president, handles the sales and distribution.

BRIDGE-CONVEYOR MINING is a strong favorite with A. B. Crichton Jr. (left), president of the new company, and C. C. Butcher, general superintendent.

MINE BOSSES: C. P. Turley (right), mine foreman; G. G. Semegon, assistant foreman, at Virginia No. 14.

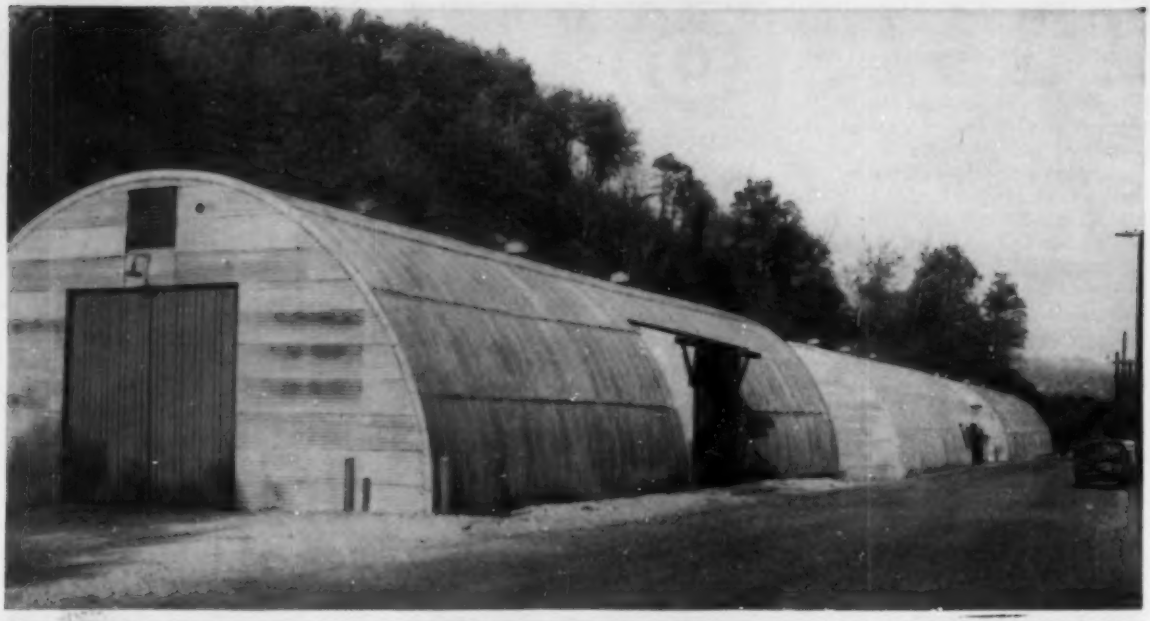
PREPARATION: Tom Pringle, preparation engineer, supervises dense-media plant cleaning B-seam coal.

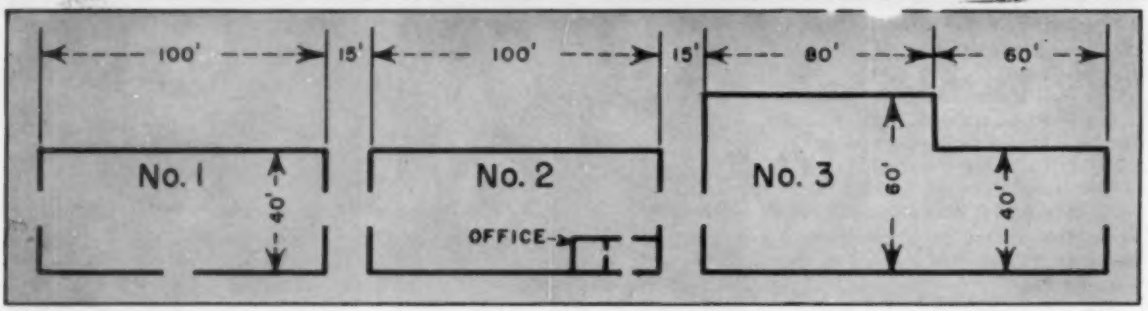
PROSPECTS FOR GROWTH

The immediate production goal with present equipment is 1,800 tons per day when the desired balance is finally struck between panel development and room work. The ultimate is 500,000 tons per year, a figure that can be maintained for a long time to come in view of available reserves.

The new company then should be injecting a $750,000 annual payroll into the regional economy, as well as making a significant contribution to the welfare fund.

Other officials, in addition to Messrs. Crichton, Butcher and Turley, are George R. Jones, mining engineer; Tom Pringle, preparation engineer; Earl Crusan, mine electrician; Joseph Labant and Willard Berkebile, tipple foremen; Walter Cunningham, shipping clerk; J. Alvin Reese, purchasing agent; Faye Horner, assistant secretary; and Margaret Mooney, assistant treasurer.





THREE-UNIT SHOP was designed to provide efficient facilities and ample working space for centralized maintenance of major mining equipment while keeping investment costs down. Putting buildings in line with 12x14-ft doors on ends permits use of portable cranes in place of bridge-crane installation.

Consol Builds Central Shop

Newly completed facilities provide better workmanship, reduced machine delays and lower maintenance costs in serving mechanized mines producing 2,000,000 tons of cleaned coal annually. Spacious buildings designed to hold down investment.

By J. H. EDWARDS
Associate Editor, COAL AGE

EFFECTIVE PLANNING and practical design aimed at providing the ample room and necessary equipment to properly repair and rebuild mining machinery at the lowest possible cost, while holding the investment within conservative limits, are evident at the new central shop of the Consolidation Coal Co. (Ky.), Div. of Pittsburgh Consolidation Coal Co., Jenkins, Ky.

The newly completed shop consists of three Quonset buildings centrally located for access to the mines, laid out for the convenience necessary for high efficiency and fully equipped with the machinery and tools needed for an effective overhaul program. Through better rebuilding of production equipment and the incorporation of many design improvements, the new centralized facilities have reduced machine delays and at the same time have cut maintenance costs.

One reason for building the new shop was the company's change to a policy of handling all rebuilding at a central shop, leaving only minor repair jobs to the individual mine shops. The old shop at Jenkins, which had served the company since 1912, was entirely too small to accommodate extra work. Jenkins was selected for the new installation because it is the company's operating headquarters, is the location of a central warehouse and is not too far distant from a central point for the mines. By highway, distances from the new shop at

REBUILDING MAIN FRAME OF LOADER includes installation of automatic lubrication as a finishing touch (left). Steel work benches have sliding-door steel cabinets, some fitted with drawers and padlocks for tools. One of the loudspeaker phones connecting buildings, shop office and nearby warehouse is at the extreme right.

SHUTTLE-CAR REBUILDING involves addition of automatic lubrication (right). On the completely rebuilt shuttle-car body (left), the end and bumper have been made heavier and given more reinforcing as a part of design improvement.

Building 1 . . . Loaders, Shuttle Cars, Continuous Miners

Jenkins are: Jenkins preparation plant, 2 mi; Marshall Branch portal of No. 204 Mine, 6 mi; Mine 214, at McRoberts, 11 mi; and Hendrix Mine, at Deane, 16 mi.

In 1953, Consol of Ky. produced 2,000,000 tons of cleaned coal. All mines are completely mechanized, principally with Joy 14-BU loaders and Joy 6-SC shuttle cars. At Hendrix, equipment also includes two continuous miners. The new shop was planned for maintenance of all types of equipment except steel mine cars. Wheel rims, however, are changed at the shop.

QUONSETS UTILIZED

As shown in the plan drawing, Buildings Nos. 1 and 2 are single Quonset units, each measuring 40x100 ft. Part of No. 3 building is a double Quonset, 60 ft wide by 80 ft long, and the remainder a single Quonset 40 ft wide by 60 ft long. At the ends of each building there are doors 12 ft wide by 14 ft high, all of which are in a line. In addition, Building No. 1 has a third 12x14-ft door located in the center on one side. An office, consisting of two rooms and using a total space of 12x30 ft, is built into a corner of the No. 2 structure.

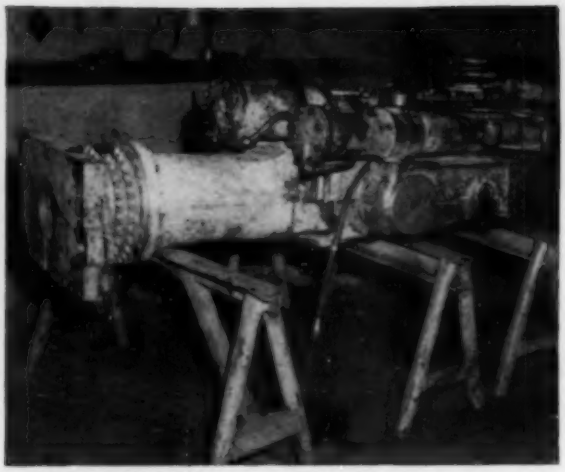
The buildings are completely insulated with 1½-in fiberglass, have concrete floors throughout and, except for the office, are without windows. Fluorescent lighting provides an illumination that is more uniform and more satisfactory than would be obtained if windows were installed. The buildings have proved easy to heat. Unit heaters are supplied with steam from a boiler located in Building No. 3. Last summer it was found that the buildings stay remarkably cool.

WORK DEPARTMENTALIZED

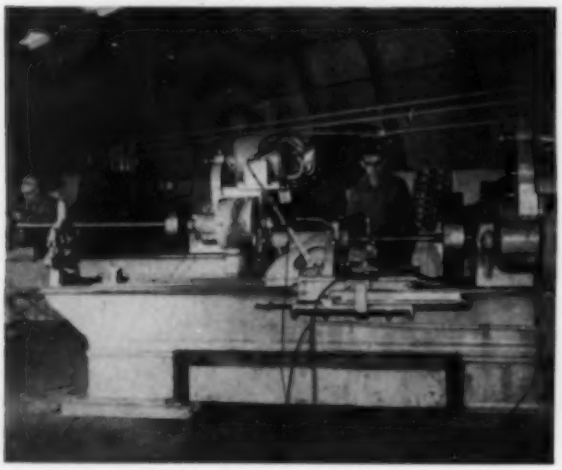
Functions of the three shop units and their major equipment are:

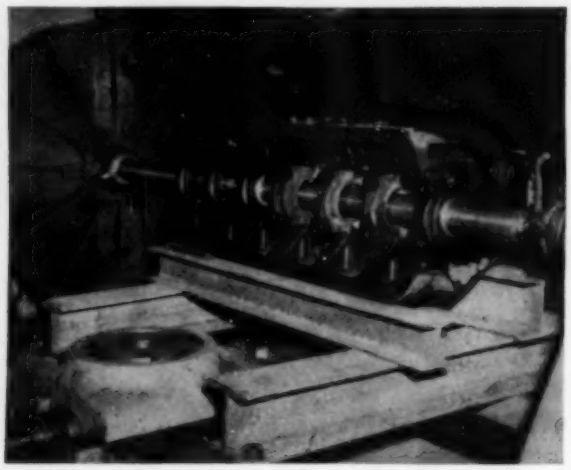
Building No. 1: Rebuilding Shuttle Cars, 14-BU Loaders and Continuous Miners — Steel work benches; two bench drills; bench vises; two 300-amp portable welders; gas-welding equipment; air-operated impact wrenches; air-operated portable drills; and a test panel for mercury tubes.

Building No. 2: Rebuilding Joy 11-RU Cutting Machines, Jeffrey 56FHR



COAL DRILL (left) in the process of being completely overhauled. At the right is a rebuilt cutterhead ready to be exchanged with one of the mines. The company's program also provides for exchange of rebuilt shuttle-car wheel units.





FOUR LATHES include these two 24-in units. Fluorescent lighting installed in windowless buildings provides excellent illumination in work areas. Machining the bearing fits of a damaged diesel engine is shown at the right.

Building 2 . . . Coal Drills, Cutters, Wheel Units

Coal Drills, Roof Drills and Other Mining Machinery — Wall-type work benches; a special floor-type work bench for repairing wheel units of shuttle cars; two arc-welding machines; Joy cable vulcanizer; Cadweld cable-conductor welder; and a 150-kw rotary converter to supply 250-v power for testing DC equipment.

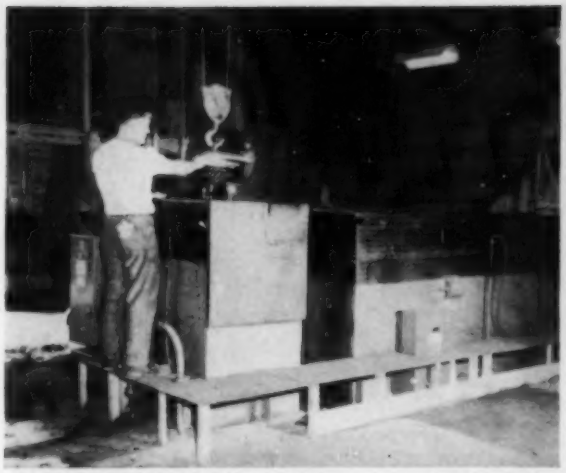
Building No. 3: Building Up and Remachining Parts for Mines and Preparation Plants—Wheel press; four lathes (a 20-in, 48-in and two 24-in units); milling machine; radial drill; 20-in shaper; bolt threader; slotter; power metal-cutting band saw; bit cutoff machine; blacksmith forge; air compressor supplying the three buildings; two degreasers; heating boiler; welding machine; and a floor-controlled bridge crane across the end where the lathes are positioned. A 20x20-ft tiled room in this building has toilet and shower facilities. The heating boiler is equipped with a Winkler automatic stoker, automatic water feed, low-water cutoff and pressure control.

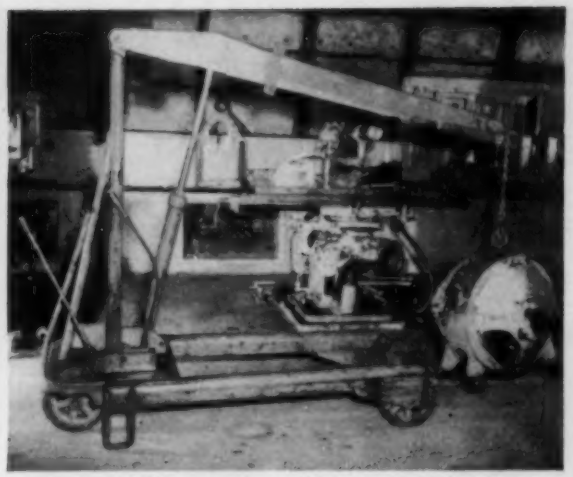
Four portable cranes serve as handling equipment as needed in all three buildings, instead of a bridge crane, and their passage is facilitated by having the end doors in line. Two are 5-ton gasoline-powered Hysters, and two are Ruger 500- to 1,000-lb hydraulic push cranes.

DEGREASERS SPEED CLEANING

At Consol's shop, the degreasers have proved to be big money savers. For example, it formerly took a man 4 hr to dismantle a shuttle-car wheel unit and wash the parts in a pan ready for inspection and rebuilding. Now with the degreasing equipment, which are Phillips vapor-type units, the whole job is completed in 1¼ hr.

In operating these units, the machine or part is not immersed in a from an electrically-heated liquid conliquid but hung instead where fumes denses on it. Dry dirt remaining after the degreasing process is easily brushed off because the grease binder has been removed. The vapor is not toxic and since it is much heavier





LOWERING a loader crank arm into the smaller of the two degreasers, which have proven big time-savers in cleaning machinery. At the right, a motor is handled by one of the two hydraulic push cranes.

Building 3 . . . Efficient Machine-Shop Facilities

than air no covers are needed over the tanks. The tank of one unit is 5x8 ft by 6 ft deep; the other, 58x30 in by 36 in deep.

Supervision and clerical work in the shop are handled by two men, D. C. Duncan, superintendent, and Delbart Boggs, clerk. Including them, the total payroll is 30. Building No. 1 works 6 men single shift; No. 2, 5 men on the day shift and 3 men on the night shift; No. 3, 8 men on the day shift and 6 at night. The crews include no special operators for the Hyster mobile cranes, and the shop workmen use them as needed. It is the company's policy to operate the shop as a separate and distinct unit.

WORK TAGS SIMPLIFY RECORDS

Accounting and keeping tabs on equipment are simplified by using work-order tags made up of four sections, each of which has the same serial number. In sending equipment to the central shop, the mine fills out the tag, tears off and files the "D" section, attaching the rest of the tag to the unit. On arrival at the shop, the "C" section is detached and placed in the shop file as a reference against which to draw supplies. When the job is completed, the truck driver delivering it to the mine gets the signature of a mine official or clerk on Section "B" and turns that back to the shop office. The top part ("A") stays on the machine until it is put back into operation.

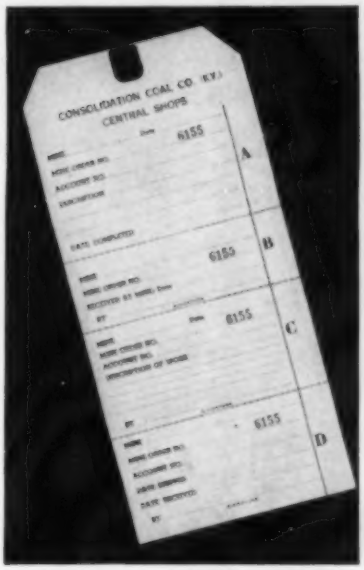
DESIGN IMPROVEMENTS MADE

At Consol, general overhauls of mining machinery include rebuilding to improve the design. All the shuttle cars and loading machines going through the new shop are being equipped with Trabon automatic lubrication. On shuttle cars, all points are so lubricated by the automatic system except the two spline shafts of wheel units. In rebuilding shuttle-car bodies, the ends and bumpers are made heavier and provided with additional reinforcing.

As mentioned, Building No. 2 has a special work bench where shuttle-car wheel units are rebuilt, but many more wheel units are rebuilt than those of the shuttle cars being overhauled in Building No. 1. The extra ones are rebuilt on an exchange basis with the mines, since it is a policy to do no wheel-unit repairing at the mines.

Another unit being rebuilt in some quantity on an exchange basis with the mines is the cutterhead for Joy 11-RU cutting machines. One spare cutterhead serves the 14 cutters in use in the mines.

The bit cutoff machine in Building No. 3 is used for making Duplex bits for Cincinnati chains, the type used on some of the cutting machines. The arc welder in No. 3 is for general welding and salvaging machine parts on which building-up and remachining is necessary.

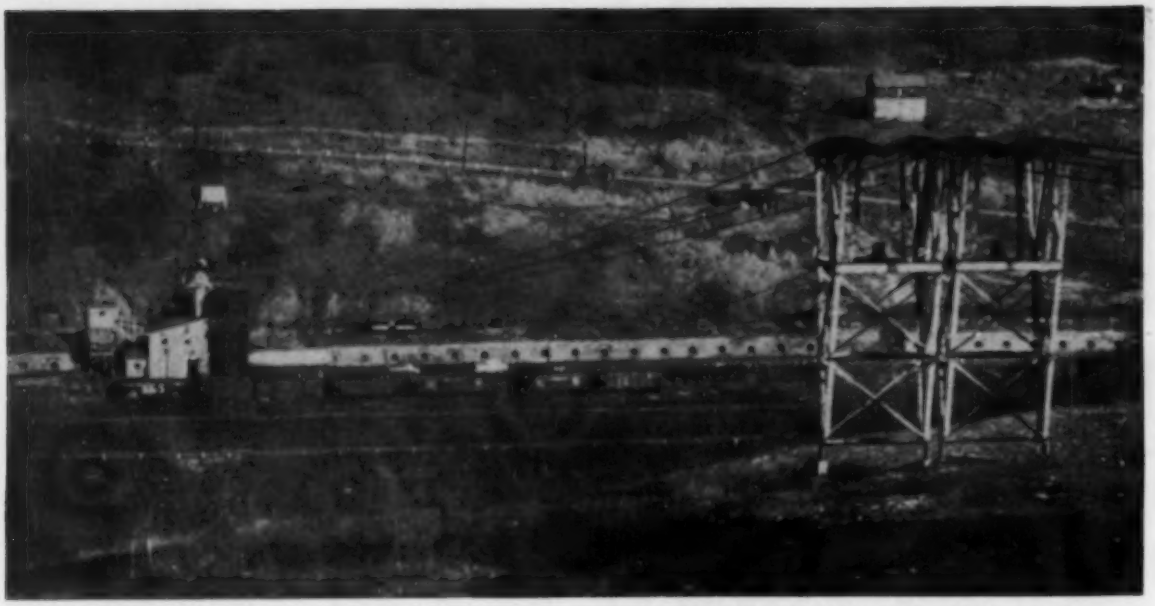


WORK-ORDER TAG applied at originating mine simplifies accounting and checking on equipment getting repairs.

SUPPLIES CONVENIENTLY LOCATED NEARBY

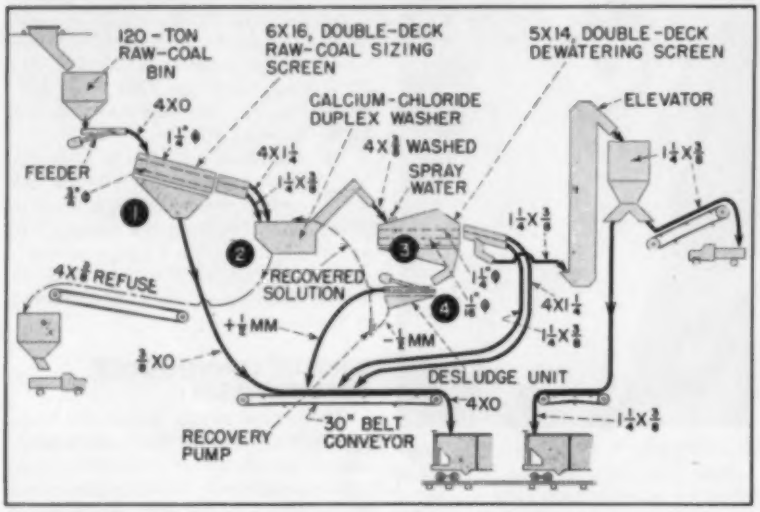
The central supply house, the original built in 1912 for the Jenkins property, is within 350 ft of the new shop, and consequently few supplies need to be stored in the shop itself. Small items, such as hose fittings and pipe fittings, are kept in the shop in rotary bins on the top of the benches. A Teletalk system in the shop office, supply house and at several locations in the three shop buildings saves steps and a lot of time.

The steel work benches along the walls have steel cabinets underneath, with tool drawers and sliding doors fitted with padlocks. The shop has no tool room. Tools such as drills and milling cutters are kept in cabinets under the benches nearest the point where they are used the most.



COMPACT PLANT, designed to fit in small area between steep bank and railroad, has handled up to 125 tph efficiently. Aerial tram spans river to carry coal to washer.

Small Plant...



HOW COAL FLOWS through the compact Bortz plant. Numbered units are the key equipment illustrated on the opposite page.

Cleans Efficiently

KEEPING IN STEP with the coal industry's march to better preparation, Bortz Coal Co. upgrades 700 tpd of Pittsburgh seam coal to provide customers with a uniform washed product. Building a plant to handle that tonnage usually offers no tough problems. But squeezing a plant in a limited area between a railroad and a steep bank calls for some engineer head scratching. To further complicate the design problem, there was no suitable area nearby to serve as refuse and water-clarification sites.

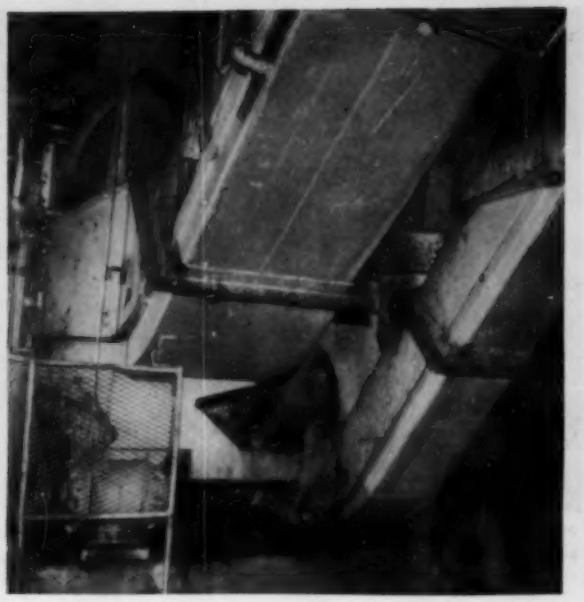
Working with engineers of the Fuel Process Co., S. Charleston, W. Va., Bortz management came up with a compact Belknap Duplex calcium-chloride plant that would prepare a washed coal of uniform quality and would require no settling pond. Further, the clean product would be dustless and freezeproofed. A rock storage bin included in the plant design would provide surge capacity when refuse trucks weren't at the plant. The complete plant, including the raw-coal storage bin outside the plant, is built on an area 43 ft 3 in by 31 ft 10 in. Plant construction was handled by the Industrial Engineering & Construction Co., Fairmont, W. Va., and electrical controls were installed by the West Virginia Engineering Co., also of Fairmont. Supervision of construction was handled by Fuel Process.

The Bortz Coal Co. has been producing coal in Fayette County for over 35 yr and the installation of modern preparation facilities along with development of a new mine is tangible evidence of their progressive management.

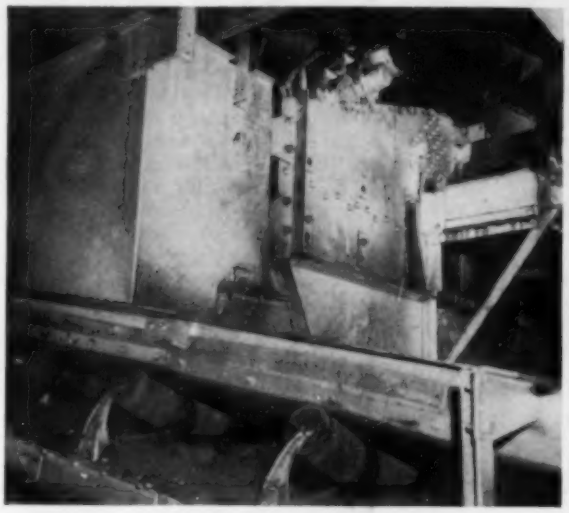
Heading up the Bortz organization is George H. Bortz Sr., president, with offices in Uniontown, Pa. Other members of the management team include: George H. Bortz Jr., vice president and assistant secretary; H. F. Bortz, vice president; C. E. Bortz, treasurer; and J. A. Henry, secretary.

The Bortz cleaning plant is located along the north side of the Cheat River several miles from Point Marion, Pa., and is served by the B&O RR.

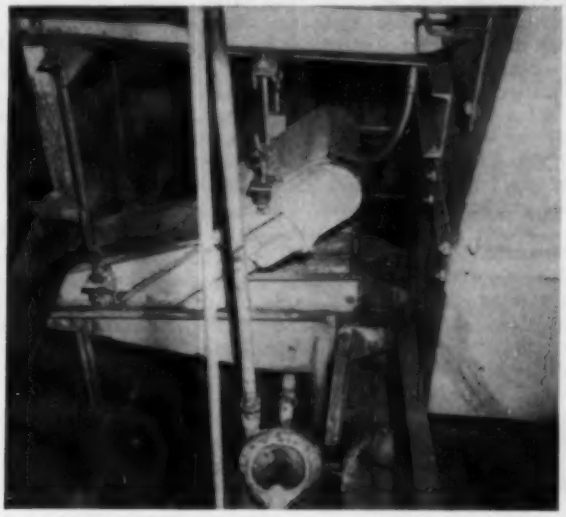
1 **PRIMARY SIZING** of raw coal is handled by 6x16 vibrator located under 120-ton storage bin.



2 **DUPLEX WASHER** is the heart of the Bortz plant. Sized coal is washed in two separate compartments.



3 **CLEAN-COAL SIZING** unit fits neatly between washer (upper right) and clean-coal belt.



4 **DESLUDGE UNIT** permits operation with closed circuit by removing 1/16-in by ½-mm coal.

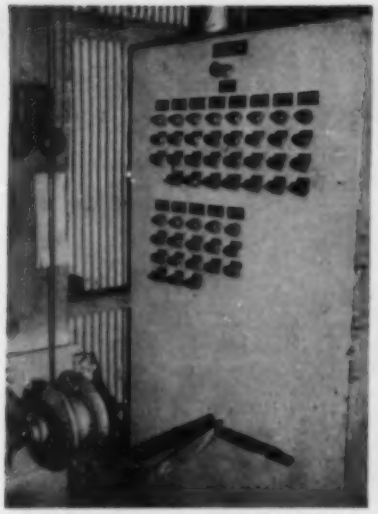
Preparation features include a 70-tph duplex-unit calcium-chloride washer, a closed water circuit, two 120-ton raw-coal bins and a 1,600-ft aerial tram spanning the Cheat River. The aerial tram was designed and installed by the Interstate Equipment Div., Yard 1, Trenton, N. J.

Coal for the plant is provided from three deep mines, one of which is in a 450-acre tract of Pittsburgh coal being developed by Bortz. The other two openings are producing from tracts leased from Bortz.

Raw coal from all three openings is delivered by truck to a hopper on the south side of the Cheat River. From there it is fed to a 36-in picking belt where one or two men remove any large refuse before the coal passes to a McLanahan & Stone single-roll crusher that reduces it to any desired size between 5x0 and 1x0. The crushed product then flows to a 24-in belt conveyor that discharges into a 120-ton storage bin.

A 1,600-ft double aerial tram spans the Cheat River and carries coal alternately in two 2½-ton 4-wheel buckets to a second 120-ton storage at the top of the preparation plant. Each tram bucket travels back and forth across the river on two 1¼-in wire cables. A 25-hp hoist equipped with air brakes is used to start and stop the buckets, but once they are in motion, the loaded bucket pulls the empty to the south side. It takes 72 sec for a loaded bucket to cross the river to the plant. Ropes for the tram were supplied by John A. Roebling's Sons and American Steel & Wire Div., U. S. Steel Corp.

A Syntron pan feeder delivers 4x0 from the north bin to a 6x16 double-



MODERN ELECTRICAL CONTROLS are housed in panel board near car-loading point.

UNIFORM WASHING GRAVITY is assured by automatically controlled feeding of makeup solution.

KEY MEN are H. F. Bortz (left), vice president and George Bortz Jr., vice president and assistant secretary.

deck Allis-Chalmers Ripl-Flow vibrator where it is separated into plus 1¼, 1¼x⅜ and ⅜x0 products. The ⅜x0 passes to a 30-in Continental Gin belt conveyor that discharges into railroad cars. Each of the other sizes is directed by separate chutes to the duplex washer and washed separately. Up to 125 tph of coal containing 12% reject has been fed to the washer with no apparent decrease in cleaning efficiency, management reports.

Clean coal from the washer passes to a 5x14 double-deck Allis-Chalmers Low Head vibrator where it is separated into 4x1¼, 1¼x⅜ and minus ⅛ slurry. The two larger sizes are directed to the 30-in belt conveyor and join the ⅜x0 from the primary separation and the combined product is loaded as 4x0. When a smaller product is desired the raw coal is crushed at the south side bin before being carried to the plant.

The 1¼x⅜ may be diverted to a Jeffrey elevating conveyor which carries it to a storage bin adjacent to the tipple. From there it may be loaded by belt into trucks for local sales or diverted to railroad cars.

The minus ⅛ is sluiced to a 12x60-in Syntron vibrator equipped with ½-mm Wedge Wire screen cloth. Concentrated solids pass to the 30-in belt and join the other clean-coal products. Underflow is directed to a 1½x1 Gardner-Denver pump and recirculated to the washer. Thus most of the calcium-chloride solution is recovered. It takes slightly over one quart of chloride solution at 1.17 specific gravity per ton of coal to keep the washing gravity at 1.50. The difference in gravity between the solution and washing gravity is made up of the ½-mm solids in suspension.

Makeup chloride solution is fed automatically to the washer from a 300-gal tank in the plant. A hydrometer and lever arrangement in the washer opens and closes a valve in the pipe line leading from the tank to the washer and thus keeps the solution at the proper gravity.

Concentrated calcium-chloride solution at 1.35 sp gr is delivered to the plant by railroad tank car. A 2x2½ Gardner-Denver pump powered by a 5-hp Louis Allis motor transfers the solution to a 25,000-gal tank outside the plant and delivers makeup solution to the 300-gal tank whenever necessary. The 1.35 solution is diluted to 1.17 specific gravity in the smaller tank.

Regular float and sink tests are made to check plant performance. Management reports that test results have shown 99% or better recovery—or about 1% coal in the refuse—even when the plant was overloaded by as much as 75%.

Bureau Points to Gas Ignitions as Danger Warning

AN INCREASE in local gas ignitions in coal mines during recent weeks is a danger signal that the mining industry cannot afford to ignore, Secretary of the Interior Douglas McKay declared late in May.

Twelve such ignitions, reported to the Bureau of Mines during April and the first two weeks of May, caused the death of one man and injuries to 25 others. Probably other gas ignitions occurred but were not reported to the bureau. Approximately two-thirds of the ignitions were caused by electricity and unsafe blasting practices.

To guard against possible disaster, John J. Forbes, USBM director, called particular attention to these precautionary measures:

1. Good ventilation is a prime requirement. Frequent examinations are necessary, to make sure that the ventilating current always has enough volume and velocity to dilute so as to render harmless and carry away flammable or harmful gases.

2. Make proper tests for gas before and after blasting, before taking electrical equipment into working places, and frequently during the operation of such equipment, in addition to the customary preshift and on-shift examinations by officials.

3. Eliminate sources of ignition by using only permissible face equipment, maintaining it in permissible condition and using explosives in a manner approved by the bureau.

4. In bituminous mines, remove accumulations of coal dust and loose coal from the workings and, at all times, maintain rock-dusting in accordance with the Federal Coal Mine Safety Act and the Federal Mine Safety Code.

a page out of the cost book

Drilled 12,000 feet. Forty regrinds. Coshocton County, Ohio. (D-1⅞" Bit.)
37 regrinds, 37 drilling shifts. Pittsburgh 8 Seam, Monongalia County, W. Va. (D-2" Bit.)
5,128 feet of slate. 5,128 feet of coal. Pocahontas Seam, McDowell County, W. Va. (D-1⅞" Bit.)
Drilled 54,000 feet in Pittsburgh 8 Seam. Forty regrinds. (D-1⅞" Bit.)
KENNAMETAL

proves KENNAMETAL* gives greater drilling footage... longer bit life

Your drilling costs are measured in terms of drilling footages — *per shift, per bit regrind, per bit life.* Kennametal Sintered Carbide Rotary Bits can reduce your drilling costs for three reasons: (1) Hard, tough Kennametal stays sharp longer, resists shock better than any other tungsten carbide; (2) rugged shanks of high quality forged steel assure full tip support . . . are designed to provide efficient conveying to auger, and (3) the wide range of Kennametal sizes and styles makes it easy for you to use exactly the right bit for each drilling job.

Reduced bit reconditioning costs, savings in drill maintenance, and better penetration rates are the natural results of using Kennametal for drilling *anywhere in your mine.* Good for 3000 to 7000 feet under normal conditions, Kennametal frequently gives far greater footages, as indicated by the four typical performance reports shown at left.

Your Kennametal representative — a man with years of actual mining experience — would like to demonstrate Kennametal's advantages. Call him anytime.

Free copy of the Kennametal Cost Book will be sent upon request. Contents include descriptions and illustrations on bit performance as well as suggested forms which can be followed for making your own bit cost analyses.

*Registered Trade-Mark

Look for the name of your Kennametal Representative in the yellow section of your phone book, or on the back of your Kennametal Price Book—or, write direct

World's Largest Manufacturer of Tungsten-Carbide

Drill Bits, Cutter Bits, Roof Bits, Strip Bits

KENNAMETAL

KENNAMETAL INC., MINING TOOL DIVISION
BEDFORD, PA.
General Offices and Main Plant at Latrobe, Pa.

FOREMEN'S FORUM

Sessions with the mine committee can be either lifelines or detonating fuses.

The attitudes of the conferees make the difference.

Supervisors can take the lead in making the meetings productive and worthwhile.

Meeting the Mine Committee

PERHAPS the most demanding of all supervisory responsibilities is that of sitting down at the conference table with the mine committee for the purpose of finding solutions to knotty problems. Such meetings can be a grinding ordeal for all concerned if clashing personalities rule the room. Conversely, they may become definite assets to both supervisors and workers if proper planning and reasonable attitudes are in evidence.

Therefore, the burden of this month's message is to set down some reminders for supervisors on (1) getting ready for a meeting with the mine committee, (2) conducting the meeting and (3) following through after the meeting.

GETTING READY FOR THE MEETING

There may be nothing new here for the "old timers", but we're asking you to read along with us to check us as we go.

How can a mine foreman or superintendent prepare himself for a meeting with the committee? What should he do first? And coming right down to brass tacks, are these meetings really necessary?

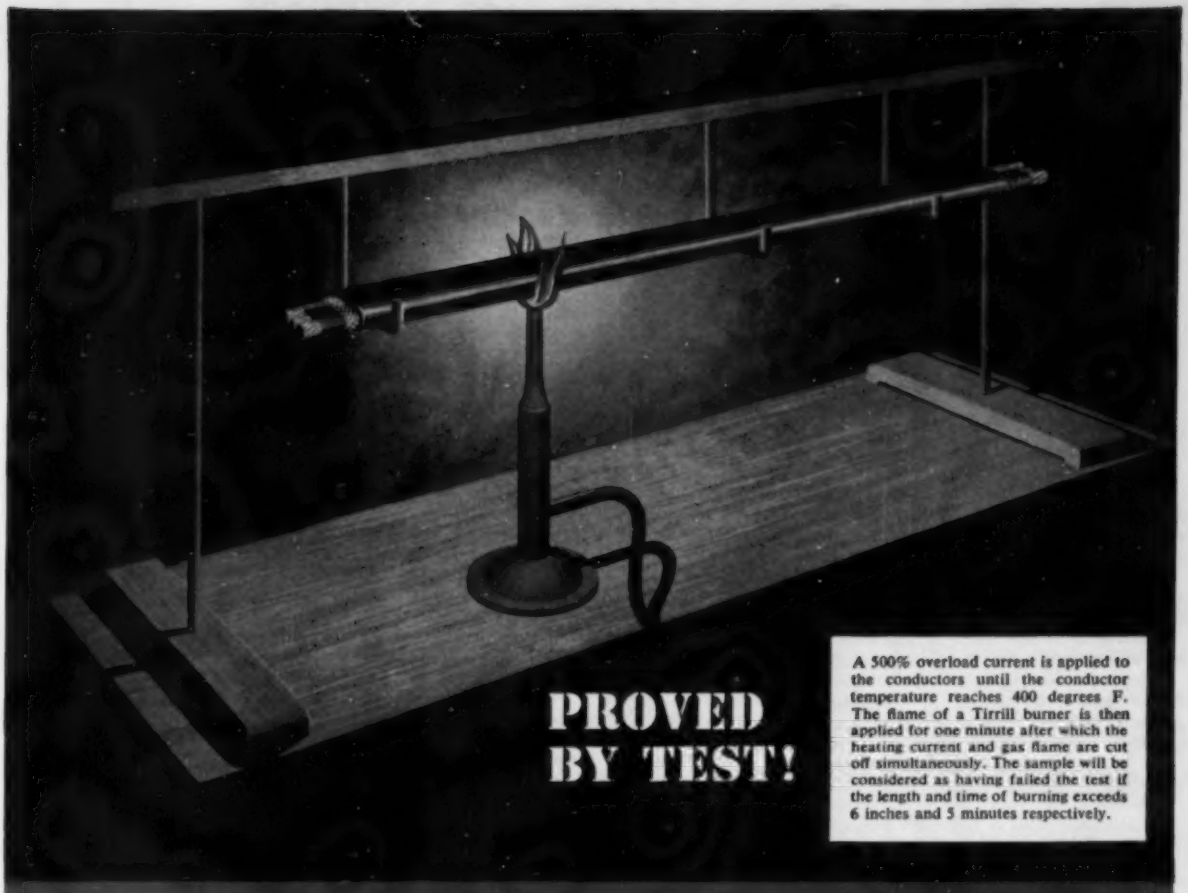
Taking the last question as a starter: Be assured these meetings are necessary. Let's face the fact that on many issues labor and management naturally will take diametrically opposed positions. Meetings like these, on a national scale or at mine level, provide the only anvil upon which these poles-apart viewpoints may be hammered into a single policy tolerable to both sides. Sure, they're necessary.

We suggest, therefore, that in getting ready for these necessary meetings, the supervisor's first step should be squaring his own attitudes with the facts governing local labor-management negotiations. That's negotiations, not collisions.

The most valuable of all attitudes is the one which leads the supervisor to think of these meetings as opportunities rather than chores. Here is the best possible forum for presenting to an influential group some of the problems which give you great concern. How much satisfaction you get for your trouble depends upon how effectively you present your case.

This brings up the question of what is to be discussed at the meeting. Some sort of an agenda is absolutely necessary if the discussion is to be reasonably controlled and, consequently, productive. We feel quite certain that a good mine foreman or superintendent has a pretty fair idea of what the committee has in mind when the session convenes. Naturally, these matters will be major items on the agenda. It is inconceivable that a good supervisor, knowing beforehand the major items to be discussed, will pass up any opportunity to collect and study all the facts pertaining to these matters.

On the other hand, don't underestimate the ability of the people across the table. In framing their demands or petitions, they undoubtedly have given due consideration to your reaction and to the arguments you will present to back up

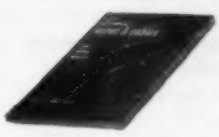


PROVED BY TEST!

A 500% overload current is applied to the conductors until the conductor temperature reaches 400 degrees F. The flame of a Tirrill burner is then applied for one minute after which the heating current and gas flame are cut off simultaneously. The sample will be considered as having failed the test if the length and time of burning exceeds 6 inches and 5 minutes respectively.

Flame-Retardant

U. S. Royal Mine Trailing Cables



Write for free illustrated booklet, "U. S. Electrical Wires and Cables for the coal mining industry."

Ordinary coal mine trailing cables – when ignited by either mechanical injury or overload – will propagate flame and may carry the fire to other sections of the mine. *But not U. S. Royal Cables!* They are jacketed with a special flame-retardant 60% neoprene compound which also withstands cutting, chipping, abrasion, grease and oil. Performance grade rubber insulation is used up to 2000-volt service. Cables for over 2000-volt service are insulated with Uskorona-1 oil base insulation and have a semi-conducting tape over the conductors.

U. S. Royal gives "Service beyond price and specification" because United States Rubber Company is the only electrical wire and cable manufacturer to grow its own natural rubber, make its own synthetic rubber and plastics. Such control of the manufacturing process results in a *quality* product. Available in black, or gold for better visibility.

UNITED STATES RUBBER COMPANY
ELECTRICAL WIRE AND CABLE DEPARTMENT, ROCKEFELLER CENTER, NEW YORK 20, N. Y.

US RUBBER

A Checklist for Meeting the Mine Committee . . .

1. Getting Ready for the Meeting

(a) Plant constructive attitudes

(b) Have some idea of an agenda

(c) Collect facts about the items on the agenda

(d) Prepare counter-proposals

2. Conducting the Meeting

(a) Keep the discussion on the subject

(b) Ask "W" questions – What? Why? When? Where?

(c) Don't be dogmatic. These are two-way negotiations, not collisions

3. Following Through After Meeting

(a) Show some results

(b) Publicize the results

(c) Make good on any promises you give

---

your position. You will have to be well informed.

In final preparation for the meeting, it might be profitable if you made a list of demands and petitions of your own which you would like the men to adopt. There should be no ulterior motive here, but surely you must want some concessions to improve existing conditions, and the committee meeting is the logical place to make your pitch.

Look at it this way. If you enter the meeting with the reasonable attitudes mentioned above, it follows that you are not going to attempt to "steamroller" the other side. By the same token, don't expose yourself to a steamroller by coming to the meeting without a sincere counter-proposal. There is nothing unethical about it if your counter-proposal is legitimate. This is collective bargaining, and collective bargaining, as we know it today, has been forged from some battle-tested human experiences, including the proper use of counter-proposals.

CONDUCTING THE MEETING

Now it's time for the meeting, and we assume you will be chairman. Be sure the conference room is clean and well lighted. Provide chairs for everybody. Pencils and pads for all conferees might be a worthy contribution. You know, doodling seems to provide a safety valve when the pressure begins to mount. If possible, arrange the chairs in a circle or around a table. Don't have anyone sitting in back of you. It makes you vulnerable.

Make a conscious effort to keep the discussion confined to the major items on the agenda. There may be any number of subjects crying for attention, but the conference cannot be productive if you try to cover too many of them. Keep notes as the meeting moves along so that you will be able to guide the arguments back into the proper channels from time to time.

You will have to ask a lot of questions in order to get all the facts on the table. Phrase your questions in a manner that will draw out information. Use "W" questions—What? Why? When? Where?

Don't be dogmatic. These are two-way negotiations. It's an odds-on bet that the committee is coming to you to present a grievance, and they don't want to hear pontifical speeches. And since we know you don't want to listen to them rave at great length, get down to the business at hand in a hurry.

No question about it, this matter of handling grievances presented by the committee is a tough problem. We know of no simple steps to make the job easier; we can only offer sympathy to the supervisor who has reached that final dilemma where he must either reject the committee's demands, thus sending the problem over his own head to higher authority, or reverse the judgment of a subordinate supervisor. Neither step can be taken lightly.

Perhaps the only advice one can offer a mine foreman or superintendent in this unenviable position is as follows:

Be intellectually honest with the facts. Don't permit yourself to be harried into a hasty decision. Make a solid decision based upon your best judgment, either way, for or against either party. This is one of those times when as a responsible official you will have to say, "This is where I choose to take a stand." And if bad turns to worse, you can always be proud of the fact that you chose your own time and place for martyrdom.

One more hint on conducting the meeting: Don't leave problems hanging in midair. Strive to attain definite agreements, mutually arrived at. Undecided issues may come back to the next meeting bigger than ever and harder to solve.

FOLLOWING THROUGH AFTER THE MEETING

Your responsibility does not fall away with the final drop of the gavel as the meeting adjourns. Now you really must go to work if you want subsequent meetings to be more valuable, better tempered and more productive.

As soon as possible, convert the decisions of the conferees into actions. Take immediate steps to correct conditions or practices which irked your committee for good reasons. If the bone of contention concerns matters of safety, be even more eager to start the corrective machinery.

Then publicize what you have done. This publicity we speak of it not "glory grabbing." It is more in the nature of communications, adopted for the purpose of letting everyone know you consider committee meetings worthwhile and productive.

Above all, make good on any promises you have made at the conference. You will be leading by example, which is about the only way to lead.

In wrapping this up, let's make a pair of points, as follows:

1. Stick to your guns when you're sure you are right, be fair with the facts and hold your temper. Sooner or later, your firmness, fairness and equanimity will have a beneficial effect on the atmosphere of the meetings and on morale at your mine.

2. Understand the practical fact of life that both you and the committee may in all determination approach the conference table with lists of demands, petitions and grievances as long as your arms, but that your lists may have to be somewhat diluted by Santa Claus. From a standing start at the extremes, you must finally come to agreement somewhere between.

Bits of Wisdom for Foremen . . .

Some people can't tell the difference in being broadminded and in stretching their conscience.

Unless you, as the foreman, make gas tests as often as you should, there is no reason to expect your workmen to do any better.

The only trouble with common courtesy is that it's not so common.

Today! Check on all men who fire shots. See that they notify others, block all entrances to the place being shot and that they shout "Fire" three times.

Correction is grievous unto him that forsaketh the way; and he that hateth reproof shall die.

Every haulage wreck is not only an accident, it is also a potential injury. More brakemen are probably injured as they attempt to retrack wrecked equipment than are injured in the wreck itself.

Most of us carry our own stumbling block around with us. We camouflage it with a hat.

Many accidents have occurred because workmen have removed one fuse nip when they thought they were removing another. . . . Scotchlite labels for marking fuse nips can be obtained.

The mill wheel is never turned by the water that has passed.

As long as you know your men are working safely your work is easier. It's when they are taking chances that things go wrong, work and worry build up.

***—Foreman's Notebook.* Eastern Gas & Fuel Associates**

for lower cost control of moderately **Corrosive** fluids

Fig. 2651-A Gate

JENKINS

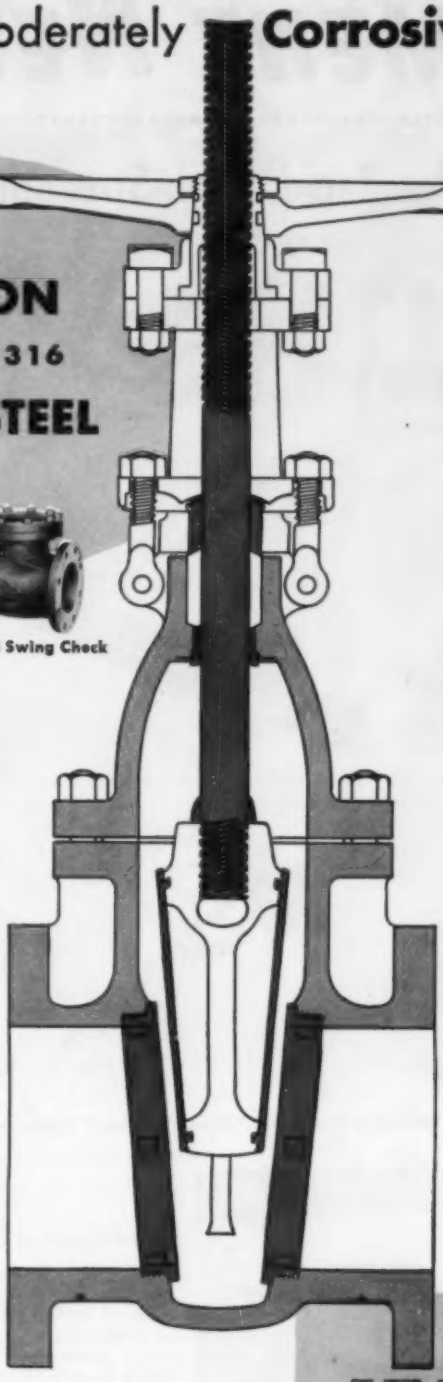
NICKEL IRON

Valves with Type 316

STAINLESS STEEL

Trim

Fig. 2624 Swing Check



This combination provides corrosion resistance well above the moderate need in many processing services with an investment well below that for all-stainless steel valves.

Designed primarily for the chemical process industries, they are recommended for control of mildly corrosive liquids with minimum quantities of mineral acids, such as creosote in wood treatment, and many liquids carried in petroleum processing.

A major use is in pulp and paper processing, particularly in lines serving the digester, and in the chemical recovery cycle. Service records in lines carrying the valve-punishing "black liquor" give Jenkins Nickel Iron Valves top performance rating.

Jenkins *extra value* construction throughout. Get details — compare. See why they stretch your valve investment dollar — with longer service life, lower maintenance cost.

Every part in contact with fluid is the right metal to block corrosion and beat wear.

CAST NICKEL IRON

- **BODIES** Heavy duty, dimensioned for greater resistance to wear and abuse. Through port design in Gate Valves.
- **BONNET** Rugged construction, like body. Swing-type gland bolts. Screwed-in back-seating bushing. Deep stuffing box.
- **YOKE** Integral with bonnet in 2″ to 4″ sizes.
- **WEDGE** In 10″ to 24″ sizes, with Stainless Steel Wedge Rings.
- **COVER** In Check Valve.

Type 316 STAINLESS STEEL

- SPINDLE
- GLAND
- BONNET BUSHING
- SPINDLE RING
- WEDGE PIN
- WEDGE RINGS Rolled into Nickel Iron Wedge in 10″ to 24″ sizes.
- SEAT RINGS
- DISC and HANGER in Check Valve

NI-RESIST Type No. 2

- WEDGE of I-beam structure is solid NI-RESIST in 2″ to 8″ sizes.

PRESSURE RATINGS

2″ to 12″—200 lbs. O.W.G.
14″ to 24″—150 lbs. O.W.G.

ALSO RECOMMENDED for fluids used in electroplating, photograph finishing, textile bleaching, dyeing and finishing and heat treating of metals.

GET COMPLETE SPECIFICATIONS from your Jenkins Valve Distributor, or write: Jenkins Bros., 100 Park Ave., New York 17. Ask for Bulletin 118.

JENKINS VALVES

LOOK FOR THE DIAMOND MARK

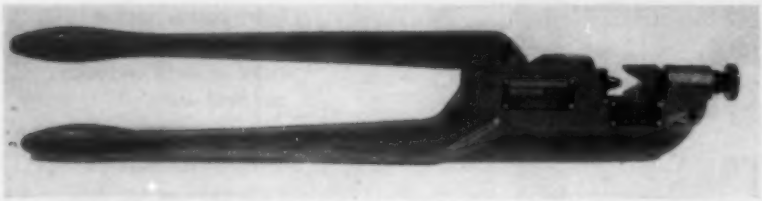
SINCE 1864

JENKINS

Jenkins Bros.

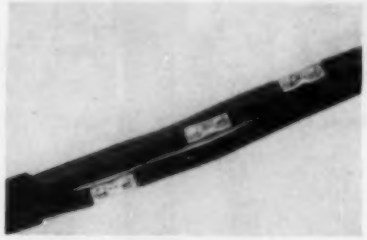
EQUIPMENT NEWS

New Method for Rapid, High-Strength Cable Splices (1)

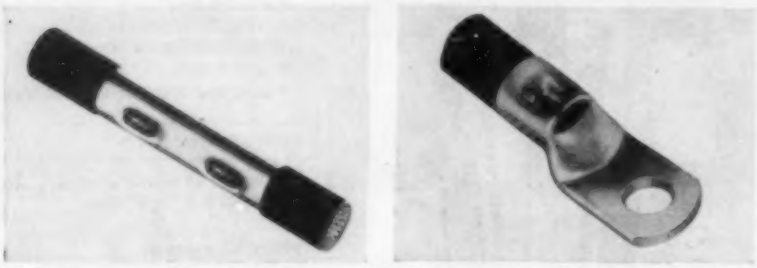


SPLICING TOOL, the Burndy "Hytool," quickly installs permanent or temporary cable splices and terminals said to withstand tensions up to 6,400 lb.

IN OPERATION, Hytool has easily adjustable dies that fit various cables.



COMPLETED SPLICES are compact, with high conductivity, low resistance.



FOR SPEEDY INSTALLATION, "Hylink" splice (left), "Hylug" terminal (right).

A new compression method for making emergency or permanent splices on mining machine cable from No. 8 stranded through 4/0 said to withstand tensions up to 6,400 lb has been announced by the Burndy Engineering Co., Inc., Norwalk, Conn. Burndy "Hylinks," made of pure electrolytic-copper seamless tubing, are compression-installed by use of the Burndy "Hytool" MY29-11. This lightweight, easy-to-operate manual tool (top photo) has a single adjustable nest die in alignment with an index plate calibrated for each size of mine cable. A knurled knob controls the position of the nest die and no removable dies are necessary. The Hytool also is calibrated for commercial cable.

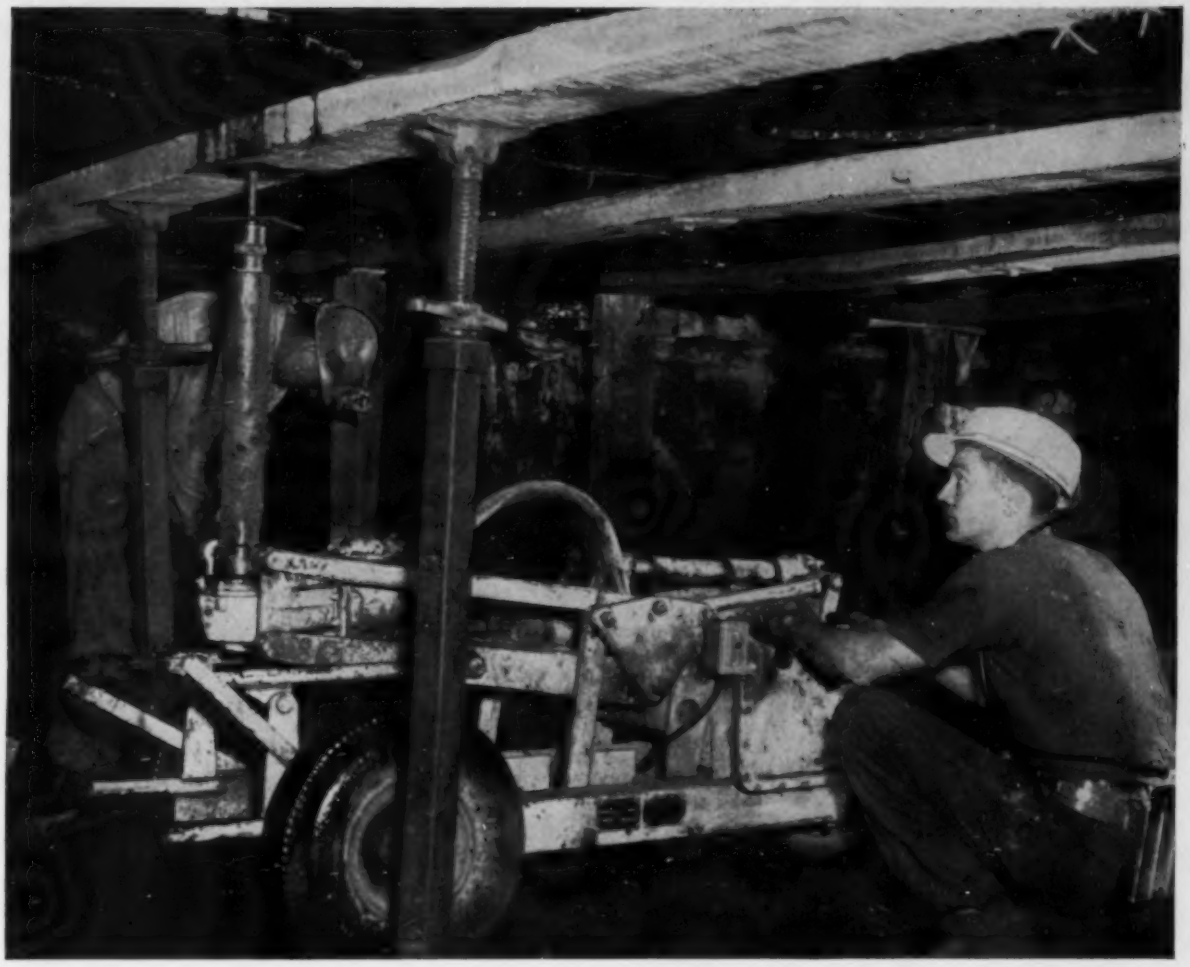
The Burndy Hylinks, installed as either emergency or permanent splices, are electro-tin-plated to reduce corrosion and provide compact, low-resistance connections that maintain high conductivity and high mechanical strength under the severe tension and torsion conditions of mine operation, the company reports. The Burndy "Hylugs" are compression terminals installed with the same MY29-11 Hytool. They provide the same features as Hylinks and offer similar advantages in terminating mining machine cable. Circle No. 1 on the postage-free card facing p 104 for full details from Burndy Engineering.

FOR a convenient checklist, tear out the postage-free card facing p 104 now. Then as you go through this section, circle numbers of items that interest you.

Self-Propelled Unit for Lubrication (2)

A small self-powered, self-propelled "service station" for maintenance of heavy equipment in the field has been announced by the Prime-Mover Co., Muscatine, Iowa. Powered by a 6-hp Wisconsin engine, the unit is designed to travel over rough ground and up steep slopes and can be run up planks into a truck for long hauls between jobs. The unit is arranged to use standard 100-lb lubricant drums and features Alemite equipment for handling motor oils, gear lubricants and pressure-gun lubricants, as well as an air-delivery hose with tire chuck. Complete with compressor, air tank, space for three 100-lb drums, tool trays, service hoses and lubricant pumps, the self-contained "station" is only 31 in wide and is readily maneuverable between machinery. Full details from the company.

sure way to *faster* roof bolting



When the Chicago Pneumatic RBD-30 Permissible Roof Bolting Unit is moved into a seam it really gets to work fast! Its low 28″ overall height permits easy entrance and affords effortless operation in low headroom areas. The telescopic chuck permits 10″ auger adjustments to speedily conform to variable roof heights.

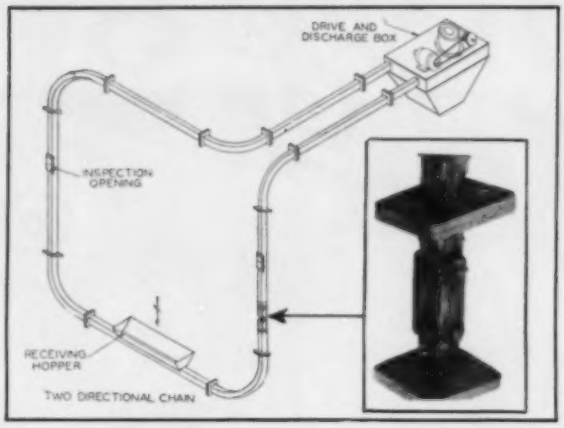
And without repositioning it completes an entire cycle from drilling hole to setting expansion bolt in 3 minutes time. But in cases where hole depth is less than 36″, installation can be made in 1½ minutes flat! Built-in slip clutches protect the drill and bolt-setting motor . . . prevent feed motor from stalling. One rugged motor drives both auger and bolt setter. For more information write *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*

Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

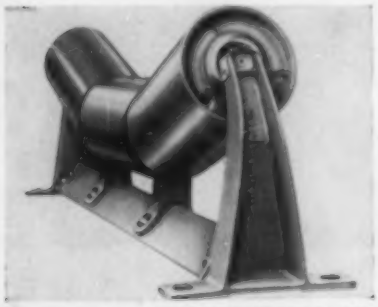
Large-Capacity, High-Power Tractors (3)

Four new tractors of unusually high power-to-weight ratio have been announced by Mack Trucks, Inc., New York 1, as additions to its Model B line designed for high-capacity, top-performance service. The new Models B-70T, B-70ST, B-71T and B-71ST are 4- and 6-wheelers, gasoline and diesel powered, with engines of 206 and 200 hp, respectively, and the 4-wheel models are rated from 50,000 to 63,000 gcw, the 6-wheel units at 76,800 gcw. Utilizing the advanced "B" Series design, the tractors offer increased power and performance with compactness and relatively low weight, high-strength construction throughout and improvements in economy and ease of maintenance and servicing, the company reports. Among the features cited by Mack are: a wide range of Mack-built transmission options to fit individual requirements; the recently developed Mack Vibrasorb clutch; wide-tread front axles for maximum stability and steering ease; Mack dual-reduction rear axles with multiple options for a wide variety of final ratios; the Mack Balanced Bogie with its exclusive inter-axle power divider on the 6-wheel units; and the "Unitized Cab" for full driver comfort and safety. Lower operating costs are achieved, the company says, through the combination of heavy-duty construction, insuring reliability with minimum down time, and greater accessibility to speed routine maintenance. Circle No. 3 on the postage-free card facing p 104 for full details from Mack.



Enclosed Conveyor Has Two-Way Chain (4)

A new totally enclosed conveyor featuring a two-directional chain and two-piece metal flights conveys any free-flowing material through a square tubular section in any direction and at various angles as illustrated, according to the maker, Prab Conveyors, Inc., St. Clair Shores, Mich. Among the features cited by the company are: operation in more than one direction without transfer points; use of any number of feed and discharge points; totally enclosed, dust- and liquid-tight operation; replacement of flights without disassembly of chain; and maximum surface contact between flight and square tube. The "Tube-veyor" is presently available in tube sizes up to 6 x 6 in and chain speeds up to 30 fpm. Bulletin R-20 with details offered by Prab Conveyors, Inc.



NEW SEALS FOR BELT IDLERS (5)

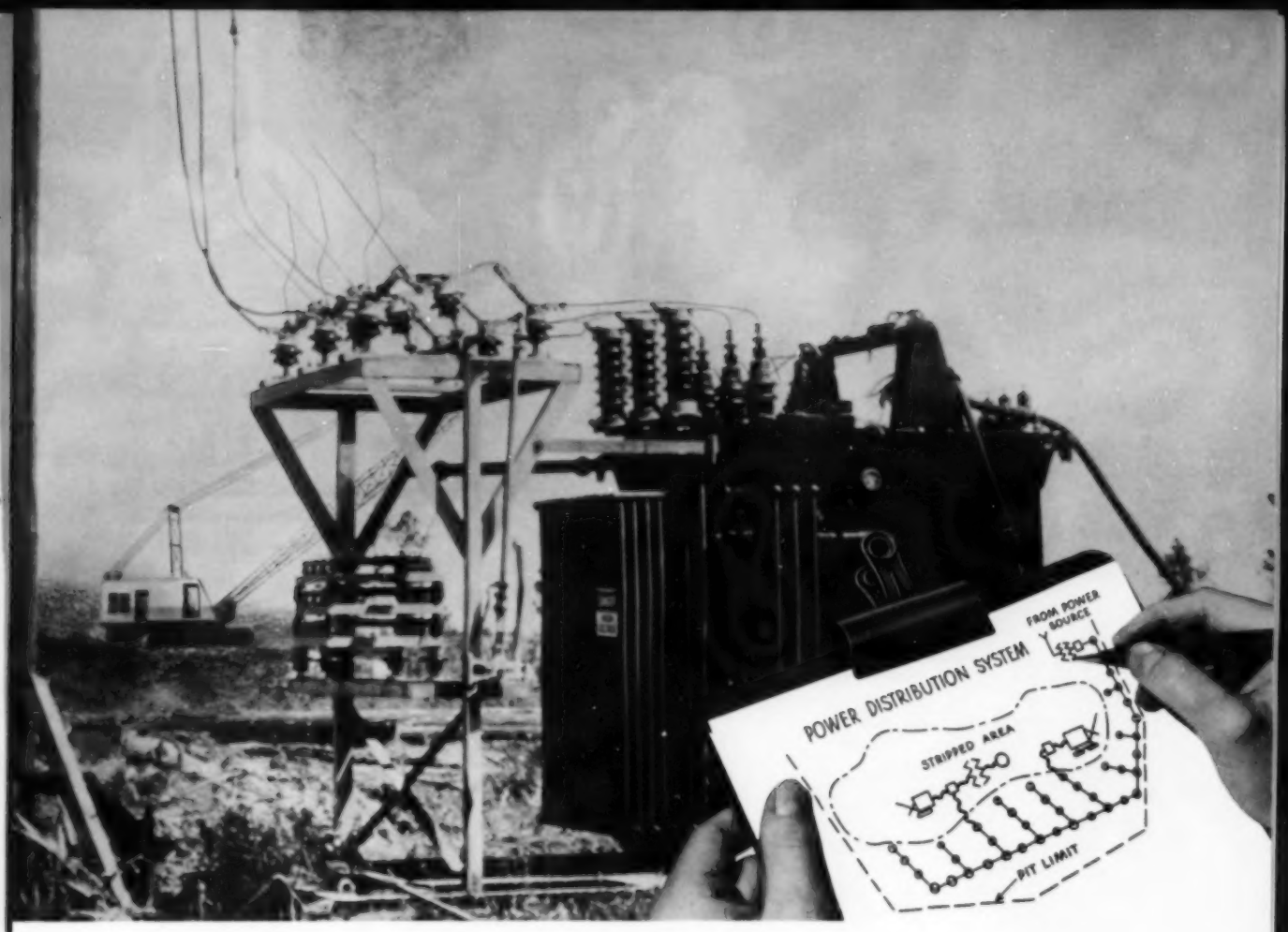
The Jeffrey Mfg. Co., Columbus 16, Ohio, has announced its new MD and HD Series belt idlers, said to offer new advances in belt conveying and as nearly perfect balance in design and construction as possible. Major feature of the line is the new "Duoflex" seal, a flexible contact seal said by the company to perform the dual function of keeping out dirt and retaining the grease for practically an endless period of time. While factory packing and sealing create a permanently lubricated idler, design permits regreasing from either end when and if desirable through the shaft, grease reservoir and the neoprene shaft connectors. Other features cited include easy roll removal without loosening or removing the stands; belt-carrying rolls of extra-heavy electric-welded steel pipe; and 2-deg tilted end stands to give the center roll more control over the belt. Special-purpose auxiliary idlers in the line offer similar features, plus additional design improvements adapted to their particular applications, it is said. Full details from Jeffrey.

4-WAY SHOVEL UNIT (6)

Designed to permit handling varied earthmoving jobs with one machinery unit, the new Drott "Four-in-One" hydraulic-controlled attachment for International TD-6 crawler tractors can be immediately converted into a bullclam shovel, bulldozer, front-end loader or clamshell when the tractor is either moving or standing still by merely moving the "shovel-selector" lever located within easy reach of the operator. Shovel capacity is ⅞ yd with lifting capacity of 3,000 lb, and bottom dumping gives the "Four-in-One" a clearance of over 14 ft above the ground when operating as a front-end loader. The unit also may be used as a backhoe. Full details from International Harvester Co., Chicago 1.

ELECTRIC HOLE DIGGER (7)

The "Super Hole-a-Matic," an electric-powered, lightweight one-man-operated earth-boring machine, has been announced by the Multi-Matic Corp., Van Nuys, Calif. Available for holes from 4 to 12 in in diameter, the unit operates at any angle with a pulverizing action and will not bend, break or throw the operator when encountering obstructions, the maker says. Uses cited by the company include digging post and other-type holes, earth and coal sampling, tunneling for conduit and other lines up to 30 ft or more, with shaft extensions and soil testing down to 15 ft or more with extensions. For remote operation, it may be powered by a 100-lb 1.25-kw or larger AC or DC generator. Bulletin with full details from company.



How Westinghouse helps you outstrip tonnage records

. . . with dependable power distribution
. . . with coordinated electrical drives

Here's the heart of your plans to increase strip mine production this year . . . your electrical distribution system. Can it meet the demands you may place on it? By helping you plan electrically, your local Westinghouse engineer gives you added assurance of service continuity and lower operating costs.

Service continuity depends on applying the proper equipment to meet power demand as well as the demand in each load area. Westinghouse unit substations or CSP® transformers provide system protection while maintaining proper voltage in the load area. Compact, factory assembled, these skid-mounted units are solidly constructed to take rough handling. Lightweight Hipersil® transformer cores allow them to be moved more easily. Dividing the load among Westinghouse unit substations makes it easy to isolate any area of the operation without disrupting service. It has long-term advantages, too, in allowing easier expansion to meet increased power demands.

Lower operating costs result from system planning to bring higher voltage close to the load. Power transmission losses are held to the minimum. Operating efficiency of equipment is improved by better voltage regulation. Motors deliver full rating, and you get maximum power for each job.

Next page, *step up flow from strip mine to cleaning plant . . .*

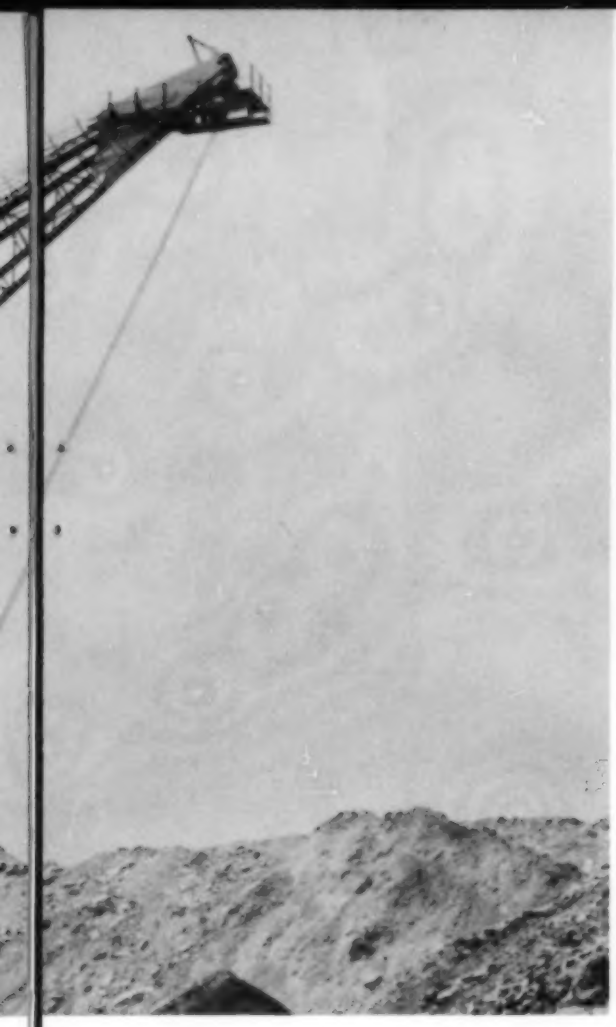
Page 1 of 4 in this section

This Westinghouse-equipped walking dragline digs 130 ft. deep. Picks up a 32-ton load in one bite, dumps it 437 ft. away and returns . . . all in a 60-second cycle. Coordinated Westinghouse drives can help you get production like this, too.

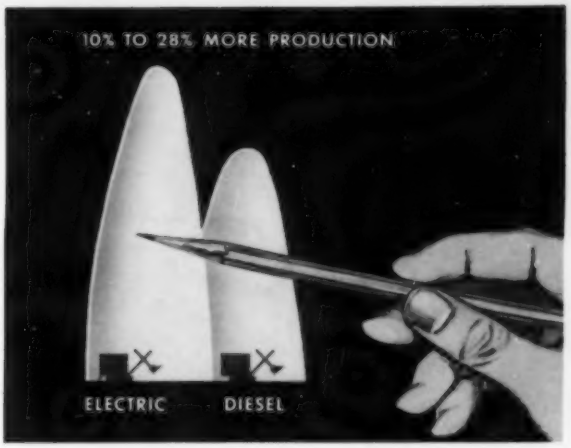
Westinghouse skid-mounted switch house handles three outgoing feeder cables. It contains an oil circuit breaker, disconnect switches, overload and ground protective equipment and plug-type receptacles.

Rototrol increases machine efficiency. Operator doesn't have to worry about damaging the equipment when working at full power. The control's simplicity makes servicing very easy.

Heavy-duty d-c motors for shovels and draglines are specially constructed with low inertia armatures for rapidly reversing service. Improved commutation allows these motors to handle heavy peak loads quickly.



New Life-Line "A" motors provide dependable power for auxiliaries. Four-way sealed, pre-lubricated bearing assembly eliminates the need for costly greasing. Dust, dirt, and moisture are sealed out—grease sealed in. There is no danger of over or under greasing.



Move greater tonnage with coordinated electric drives

By coordinating the design of motors, control and generators, built specifically for shovel and dragline service, Westinghouse helps you keep tonnage moving at a high rate.

Smooth, controlled operation increases production

For example, the d-c adjustable voltage control with Rototrol® regulator is the brain of shovel or dragline operation. When fast action is necessary, as during the swing, Rototrol "forces" the electric drive. The responsive action is quick, fluid and smooth. This prevents shocks to your equipment and speeds up the operation. Rototrol decreases shock loads on the machinery. During the hoist, swing, and drag or crowd operation, the motors will stall out rather than force the bucket (or dipper) and cables beyond the limits of safe operation.

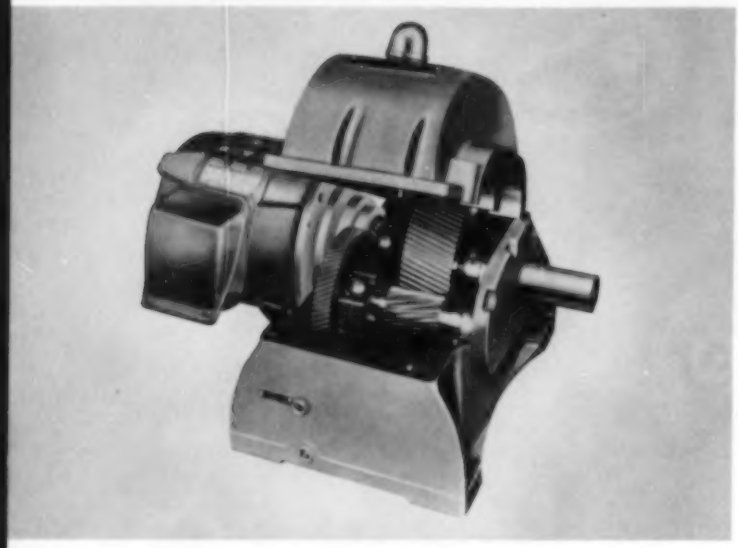
Dependable operation maintains continuous flow

Increased protection given Life-Line® "A" motors makes them well suited to auxiliary drives on shovels and draglines. New Bondar conductor insulation offers unusual resistance to heat caused by temporary overloads. Bondite stator insulation includes silicone particles homogenized with the varnish to provide protection against moisture, dust and dirt. Cast-iron drip-proof and TEFC enclosures stand up to knocks, jarring and rough handling.

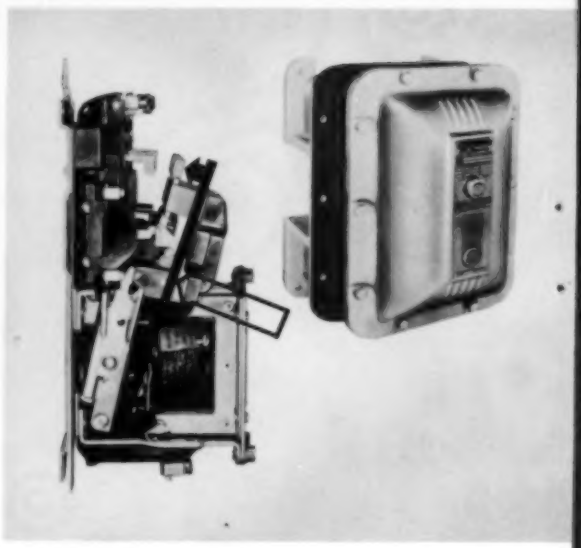
YOU CAN BE **SURE**...IF IT'S
Westinghouse

Next page, *how to maintain peak operation*

How Westinghouse engineering helps you continue peak operation



Fast inspection of Westinghouse Life-Line gearmotors results from horizontally split gear case that can be unbolted and removed without draining oil, dismantling, or disconnecting the load. Fewer moving parts simplify inspection and servicing.



Simplified design of the Life-Linestarter has only one moving part with a seesaw-balanced, clapper action that will not stick or jam. It is self-aligning . . . not subject to false operation from vibration or shock.

Product design for rugged use

The durability of Westinghouse-designed equipment helps you maintain record-breaking performance. By coordinating motors, generators, gearmotors and control for shovels, draglines and auxiliary mining equipment, your Westinghouse engineer provides integrated, reliable performance. All units are designed to work together for highest efficiency and ease of operation.

Field Service to speed inspection and repair

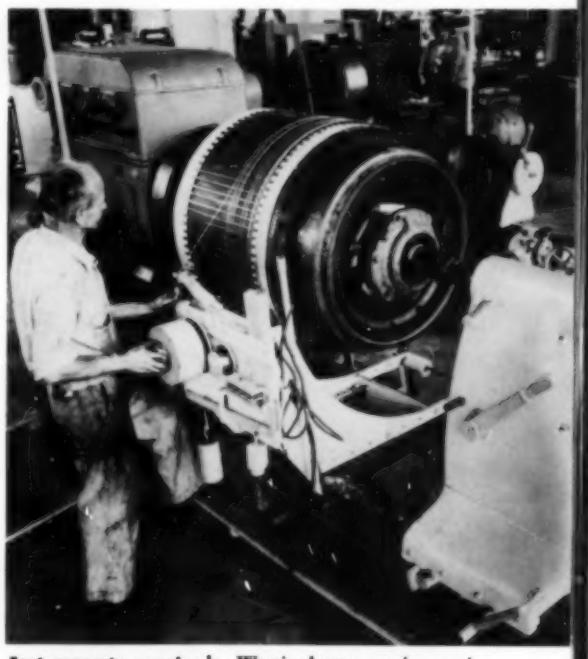
Westinghouse Field Service Engineers operate from a nationwide network of 56 field offices. They give all new Westinghouse-equipped shovels and draglines at least one free inspection the first year of operation, and are always available in case of need.

Thirty-eight strategically located Westinghouse Manufacturing and Repair Plants are available to give you fast service on all types of electrical apparatus. Any complete rebuilding job receives the same one-year guarantee given to new equipment.

For further details

Your Westinghouse representative will be glad to answer any questions you may have and get you a copy of any of the literature listed below; or write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania.

(a) Power Distribution and Protection for Open-Pit Mines and Quarries B-5447
(b) New Life-Line "A" Motor B-6154
(c) Life-Line Gearmotors B-5645
(d) Automatic Operations Start with Westinghouse Controls B-5882
(e) Complete Industrial Control B-6051
(f) Equipment for Shovels and Draglines B-5476



Fast accurate repairs by Westinghouse service engineers are handled in the field for equipment that cannot be moved or at 38 strategically located Manufacturing and Repair Plants.

YOU CAN BE SURE...IF IT'S Westinghouse

MP3029

NO MESSY CLEANUP WITH SHORT-RUN DUPLICATOR (8)

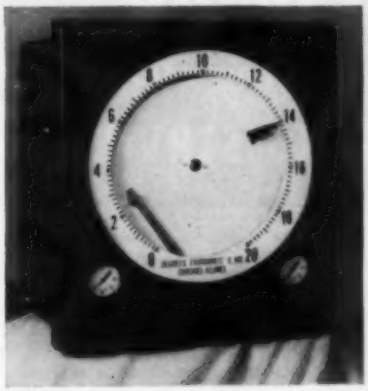
A new duplicating process offering speed and economy for employers and cleanliness and better working conditions for typists, draftsmen, machine operators and others using it has been announced by the A. B. Dick Co., Chicago 31. The new "Azograph" process permits making up to 50 clearly legible copies of typed or handwritten material, office forms and memos, engineering paper work, diagrams and sketches, etc., without staining hands, clothing or the work itself. It eliminates such difficulties as "purple stain" encountered with aniline-dye processes, and no expensive employee time is needed for cleanup of typewriter or duplicator. Corrections can be easily made on the master sheet, also without staining. Two duplicators are available for use with the new Azograph master sheet, a hand-operated model and an electrically operated machine which may also be used for duplicating by the aniline-dye process. Bulletin 3767 with full details from A. B. Dick.

TORQUE CONVERTERS FOR SMALLER ENGINES (9)

Torque converters meeting the requirements of heavy-duty operation in the lower power ranges, the new TC-200-300 Series Allison "Torqmatic Drives" for use with either gasoline or diesel engines of 40 to 150 hp, have been announced by the Allison Div., General Motors Corp., Indianapolis 6, Ind. Designed as a standard package especially for the industrial field, the converter features flexibility of application and ease of installation, since oil cooler and all oil lines are integral with the unit. Installation can be made on any SAE standard power-takeoff flywheel. With the new series, Allison Torqmatic drives now are available for both gasoline and diesel engines from 40 to 400 hp for cushioning drive-line shocks, providing longer life for drive lines, cables, tires and other equipment subject to damage through sudden heavy loading; and to eliminate gearshift guess and maintain a constant balance between engine and load requirements, the company points out.

MOISTURE ABSORBER FOR ELECTRICAL COMPONENTS (10)

"Dri-Pak," a small-diameter, tubular-type flexible synthetic bag holding dehydrating material available in various sizes, has been introduced by National Mine Service Co., Beckley, W. Va., as a means of reducing moisture and the corrosive effect of dampness in electrical compartments in and around mines. Said to be particularly useful in electrical control panels, the unit also can be fitted into idle electric motors and other enclosed and confined places. The Dri-Pak unit normally requires 4 to 5 mo to become saturated and it can be reactivated any number of times by placing it in an oven for 3 hr at a temperature of 325 to 360 deg, the company says. It does not generate objectionable gases, is nonpoisonous and is an electrical insulator itself. Details from National Mine Service.

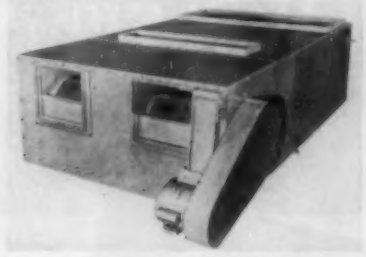


RECORDING CONTROLLERS (11)

A new line of process instruments including potentiometric and AC bridge recorders and recording controllers has been announced by the General Electric Co., Schenectady 5, N. Y. The instruments, designed for continuous measurement and control uninterrupted by periodic standardization, incorporate new measurement circuitry and components, according to the company. Foremost among the new features are a magnetic standard in the potentiometric system and a bridge-balancing unit in the AC bridge system. Both models are available with either electric or pneumatic control and are equipped with an unusual centerless pointer that simplifies chart changing and leaves practically all of the chart exposed for easy reading. Design of the new line will reduce maintenance and component replacement costs considerably, it is said. Bulletin GED-2100 with details offered by G-E.

TOUGH AIR HOSE (12)

New Flexsteel air hose announced by Goodyear Tire & Rubber Co., Akron, Ohio, was designed to combat abusive external conditions found generally in the mining and quarrying industry and has performed exceptionally well in underground mine service, the company reports. A mandrel-made hose, it has a heat- and oil-resistant tube, impact- and abrasion-resistant cover, soft tan in color, and is reinforced with steel wire. In the test illustrated, a 3½-ton weight was dropped repeatedly on the hose sample in regular cycles but did not impair the operating efficiency of the hose even though tested in excess of 5,000 cycles, it is said. Details from Goodyear.



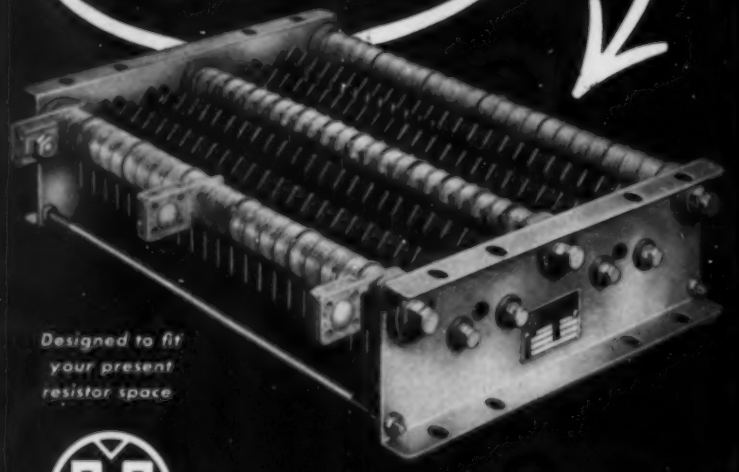
HEATING-VENTILATING (13)

A new line of Herman Nelson heating-ventilating units, designed especially for commercial and industrial applications, has been announced by American Air Filter Co., Inc., Louisville 8, Ky. The new units, with capacities of 1,200 to 15,000 cfm, can provide heating, ventilation, filtering, humidifying, or any combination of these functions, and are available for installation on floors, ceilings or walls. The units are designed for extreme flexibility in performance and installation, with a wide range of cabinet designs and air volumes and any of 10 different heating coils, both non-freeze and standard steam, and hot water coils. Sectional design of the units, with the completely rotatable fan sections, permit the selection of only the components required for a specific job, it is pointed out. Bulletin with full details from the company.

NEW DRILL TOOLS ADDED (14)

Addition of 12 new cemented-carbide-tipped mining tools to its line provides

RUGGED
all the way thru!



Designed to fit your present resistor space

P-G STEEL GRID RESISTORS
consistently prove their value in
MINING SERVICE

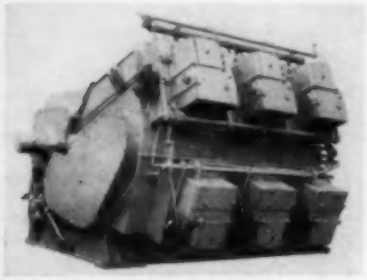
- Steel Construction
- Mica Insulation
- Corrosion Resistant
- Vibration Proof
- Moisture Resistant
- Provision for Expansion
- Adequate Ventilation
- Rugged Terminals

By use of those durable raw materials . . . steel and mica, and the P-G exclusive features of design, these steel grid resistors have the "built-in quality" to overcome factors which often cause resistor failures. Vibration, moisture laden or corrosive atmospheres have little effect on continuity of service. Try Post-Glover Resistors for heavy duty applications where resistors are subject to severe service . . . continuous "Trouble-Free" performance is assured.

P-G
The Nonbreakable Steel Grid Resistor

THE POST-GLOVER ELECTRIC COMPANY
ESTABLISHED 1890
221 WEST THIRD STREET, CINCINNATI 2, OHIO

users with a complete "off-the-shelf" selection of standard tools for both continuous and universal mining equipment, according to the Carboloy Dept., General Electric Co., Detroit 32, Mich. Included are the ADN Series V-prong auger drills, 1¾, 1⅞ and 2 in in diameter, specifically designed for hand-beld drilling and to provide improved, free-cutting rapid penetration in abrasive formations. The CC-4 ripper head bit designed for the drum that replaces the center chains in the Joy continuous miner has a ¾ x 1⅛-in forged alloy-steel heat-treated shank and a bit tip designed for heavy service. The AD auger drill bits, 1½, 1⅝ and 3 in in diameter, are designed for blasthole drilling. APT 1⅛- and 1⅜-in roof-bolting bits have forged alloy-steel heat-treated shanks ⅞ in square. For heavier roof drilling, especially in sandstone or limestone, a new harder grade of cemented-carbide tip has been added to standard heavy-duty PTH roof-bolting drills, available in 1$^{5}/_{16}$, 1⅜ and 1½ in.



NEW DRAGLINE ENGINE (15)

A new compact V-6 horizontal diesel engine featuring greater simplicity of design and construction has been announced by Page Engineering Co., Chicago 38. Built especially to provide dependable power to the load and hoist drums of Page walking draglines, the unit also features a short, rigid crankshaft as well as horizontal piston travel. Its horizontal design gives quick access to all major parts of the engine from above, reducing inspection and mainteance time, the company points out. By removing the crankcase cover, the pistons and connecting rods are exposed and can be removed without disturbing the cylinder heads or the crankshaft. Valves can be individually adjusted and timed from the head end. Details from Page.

PORTABLE VACUUM (16)

U. S. Hoffman Machinery Corp., Air Appliance Div., 105 Fourth Ave., New York, has introduced a new 5-hp portable vacuum cleaner of high capacity, de-

B.F.Goodrich

Tires speed preparation of 200 rail cars of coal per day

CLINCHFIELD COAL CORP., operates the Moss Mine in the southwestern part of Virginia. Here enough bituminous coal to fill 200 rail cars every day is mined, screened, washed and dried. Keeping the whole process on schedule is the job of the tires on shuttle cars and hauling trucks.

Tire trouble used to be a major problem, Assistant Superintendent C. T. Dahlin reports; but 3 years ago the company switched to B. F. Goodrich tires, now reports their tire problems licked. Traction Express tires (above) on shuttles operating underground carry 7-ton loads, wear almost indefinitely because the tread is up to 46% thicker than that of a regular tire.

The patented nylon shock shield under the tread of all B. F. Goodrich off-the-road tires protects the cord body from shocks and bruises. Strong nylon cords stretch together under impact, give you this 4-way saving: (1) more recappable tires and more miles per recap (2) more original hours of service (3) increased bruise resistance (4) less danger of tread separation. You pay no more for the money-saving nylon shock shield.

Stop unnecessary tire trouble now, start saving tire dollars. See your BFG retailer. His address is listed under Tires in the Yellow Pages of your phone book. Or write *The B.F.Goodrich Company, Tire & Equipment Division, Akron 18, Ohio.*

TRUCK HAULS 15 tons of gob to dump. Universal tires resist skidding and slipping on steep grades. Husky, wedge-shaped cleats give full traction in both directions.

UNIVERSAL TIRES have given such excellent service that Clinchfield has been able to recap them. Former tires often wore out after 30 days' service in wet weather.

Specify B. F. Goodrich tires when ordering new equipment

RESEARCH KEEPS B.F.Goodrich FIRST IN RUBBER

Transite Mine Service Pipe resists corrosion — provides Maintenance Economies

In mine after mine, owners and operators have found from experience that Transite* Pipe strongly resists the highly corrosive action of acid mine water—*from the inside and from the outside.* In constant use, this asbestos cement pipe has withstood the ravages of severe mining service conditions for periods of fifteen years and more without replacement. And these installations can be expected to serve for years to come, as efficiently and economically as when first installed.

Transite Pipe has other advantages important to mine operations. Light in weight, it is easy to handle . . . tight "factory made" couplings make installation easy. It is tough and strong . . . its flexible couplings enable lines to be laid around curves . . . often without use of fittings, a big advantage in restricted mine passages.

Many mine owners are using Transite Pipe for uses other than drainage. Among these are service in fresh water lines . . . for carrying sulphuric fumes and condensation . . . in spray and return lines for condenser towers. For further information, write for Brochure TR-51A. Address Johns-Manville, Box 60, New York 16, N. Y.

*Transite is a Johns-Manville registered trade mark

Johns-Manville
TRANSITE *mine service* **PIPE**

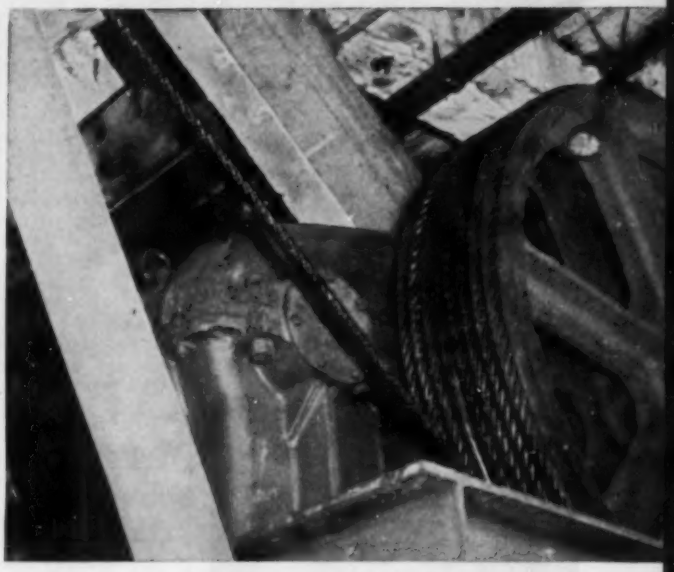
signed to operate two 50-ft 1½-in hoses simultaneously or one 75-ft length of 1½-in hose. The Hoffco-Vac 35 has a large dust bucket and is recommended by the maker as a general housekeeping tool for plant cleanup. Compact and highly maneuverable, it turns easily within its own length and operates with little vibration or noise, it is said.

STANDARD BELT CONVEYORS FOR "SHORT HAULS" (17)

A new standardized belt conveyor for "short haul" requirements, announced by Barber-Greene Co., Aurora, Ill., eliminates using components designed for higher horsepowers than needed or designing special units for installations under 40 ft. The new "Transfer Conveyors" utilize standardized components that may be assembled to form conveyors ranging from 6 to 44 ft long, in increments of 1 ft, for capacities of 50 to 480 tph. Mounted on a 5-in channel frame, which facilitates use underground or elsewhere where headroom is limited, the unit is available in 18-, 24- and 30-in belt widths and can span 15 ft between supports. Units up to 20 ft long are shipped, completely factory assembled, except for carriers and belt. Catalog 375 from Barber-Greene gives full details.

NEW-TYPE SHOVEL UNIT (18)

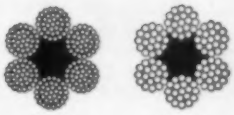
German-made DEMAG-Universal-Excavator B408 is the first of a new series featuring a new exterior appearance and machinery arrangement culminating 30 yr of design experience, the company reports. Featuring a dipper capacity of 1 cu yd, the B408 is available with various easily interchangeable attachments for operation as a shovel, dragshovel, dragline, grab or crane, and with either diesel or electric drive. Features cited by the maker include air control of the unit with only two levers and two pedals; a 2-speed transmission connected to the engine through a flexible coupling; and a chassis that is a fully closed box-section girder made of electrowelded rolled steel plates to provide high strength at relatively low weight. As a shovel, the unit has a maximum digging height above ground of 23 ft 11 in and maximum dumping range of 24 ft 7 in. Bulletin and full details from DEMAG-Baggerfabrik GmbH, Dusseldorf, Germany.



EXTRA FLEXIBILITY—Wire rope encounters fast sheave action, reverse bending, constant stop-and-start operation on many jobs. When this same rope must also lift or pull heavy loads, an unusually flexible, strong wire rope is needed.

Rope jobs like paver skip hoists, overhead cranes, large shovel and dragline hoists, and sawmill carriages demand these qualities. That's where the use of 6 x 37 Red-Strand wire rope saves time and money.

Where will 6x37 Red-Strand improve your wire rope service?



6 x 37 6 x 19

Look at a cross section of 6 x 37 wire rope. You see three rings of small, uniformly sized wires in each strand. This differs from a rope construction like 6 x 19. which contains fewer and larger wires.

The *smaller size* wires make 6 x 37 more *flexible*. The *larger number* of wires maintains rope *strength*.

Would this combination improve your wire rope service? Would it solve a problem for you? Leschen's higher-than-rated quality is also providing longer-than-expected service to heavy industry everywhere.

Check with your Leschen man. He can help you.

Leschen's 64-page Wire Rope Handbook tells you all about 6 x 37 and other Red-Strand wire rope constructions. Ask or send for your free copy.

LESCHEN WIRE ROPE DIVISION
The Watson-Stillman Company
(A SUBSIDIARY OF H. K. PORTER COMPANY, INC.)
St. Louis 12, Missouri

LESCHEN
HERCULES Red-Strand
WIRE ROPE

C-M-I

CENTRIFUGAL COAL DRYERS

RECLAIM SLURRY!

C-M-I Continuous Coal Dryers reclaim thousands of tons of marketable coal from slurry ponds annually at a very low cost per ton . . . low enough to make reclamation an extremely profitable operation.

Investigate C-M-I Centrifugal Coal Dryers. Don't let potentially valuable slurry go to waste. Write for information . . . no obligation, of course.

C-M-I Centrifugal DRYERS

CENTRIFUGAL & MECHANICAL INDUSTRIES

146 PRESIDENT STREET

SAINT LOUIS 18, MISSOURI

Equipment Shorts You'll Want to Check

(19) NEW-TYPE SAFETY HOOK developed by Coffing Hoist Co., Danville, Ill., is said by the maker to not only offer greater safety during lifting operations, but also to be simple and convenient enough so that hoist operators will make full use of its safety locking feature. Once the hook is engaged, a stamped steel latch swings down and is securely held in place by a lock under spring tension. Slight pressure on the release unlocks the latch. The hook is made of drop-forged, heat-treated alloy steel, cadmium-plated. Bulletin from company.

(20) ENGINE-DESIGN changes that have increased output of General Motors single 6-110 diesel engines to 300 hp maximum and 230 hp continuous, have been announced by GM's Detroit Diesel Engine Div., Detroit 28. The increases, totaling 25 and 17 hp, respectively, provide extra power which will be especially useful in heavy-duty vehicles, shovels, etc., subject to sudden load increases, it is pointed out. Details from GM.

(21) NEW "METAL-CLADDING" can be applied by anyone to any surface at room temperature, and not only imparts a hardness and abrasion-resistance almost equal to metallic tungsten but is self-lubricating as well, according to the maker, the Lockrey Co., Southampton, N.Y. Called "Tungstide," it may be applied by brush, dip or spray and is available for various uses, such as, air-dry application to plaster of paris, wood, masonite, plastics; baking on metal; and extreme high-temperature applications. Data from Lockrey.

(22) PORTABLE POWER SAW consists of a reciprocating blade directly connected to a gasoline engine to form a dynamically balanced universal wood-cutting tool that provides the versatility of the hand saw with the speed of power sawing, according to the maker, the Wright Power Saw & Tool Corp., Stratford, Conn. Weighing less than 25 lb, the Wright saw can fell, limb and buck trees up to 36 in and can be used like a powered hand saw to trim, notch, and rip lumber.

(23) ELECTRICAL CONNECTOR using a friction-pressure principle requires only a push and a twist to complete a tight electrical connection and cannot be pulled apart accidentally, according to the H. W. Earl Co., Coral Gables, Fla. Designed for line repair, motor connections, testing equipment, portable machinery, etc., it is available in two sizes: for wires from Nos. 8 to 0 stranded B & S gage, up to 200 amp; for wire diameters from Nos. 2 to 00 stranded B & S gage, up to 400 amp.

(24) MOBILE RADIO—General Electric Co., Syracuse, N.Y., has added a new 15-w mobile unit and a new 15-w base station unit to its line of low band (25-50 mc) 2-way radios. The new mobile unit may be operated without additional equipment, from either a 6- or a 12-v power source. The transmitter, receiver and power-supply chassis are conveniently mounted within one small, louverless completely enclosed housing. Bulletin ECR-152A from G-E.

FREE BULLETINS AVAILABLE

(25) MINE CARS—64-p Catalog 354 "Bethlehem Mine and Industrial Cars," describes the company's car line. Illustrated are cars of large and small capacities, 4-wheel trucks, all-steel construction, forged-steel wheels, automatic couplers, side-dump and end-dump, floating drawbars and other features. Available from the Bethlehem Steel Co., Bethlehem, Pa.

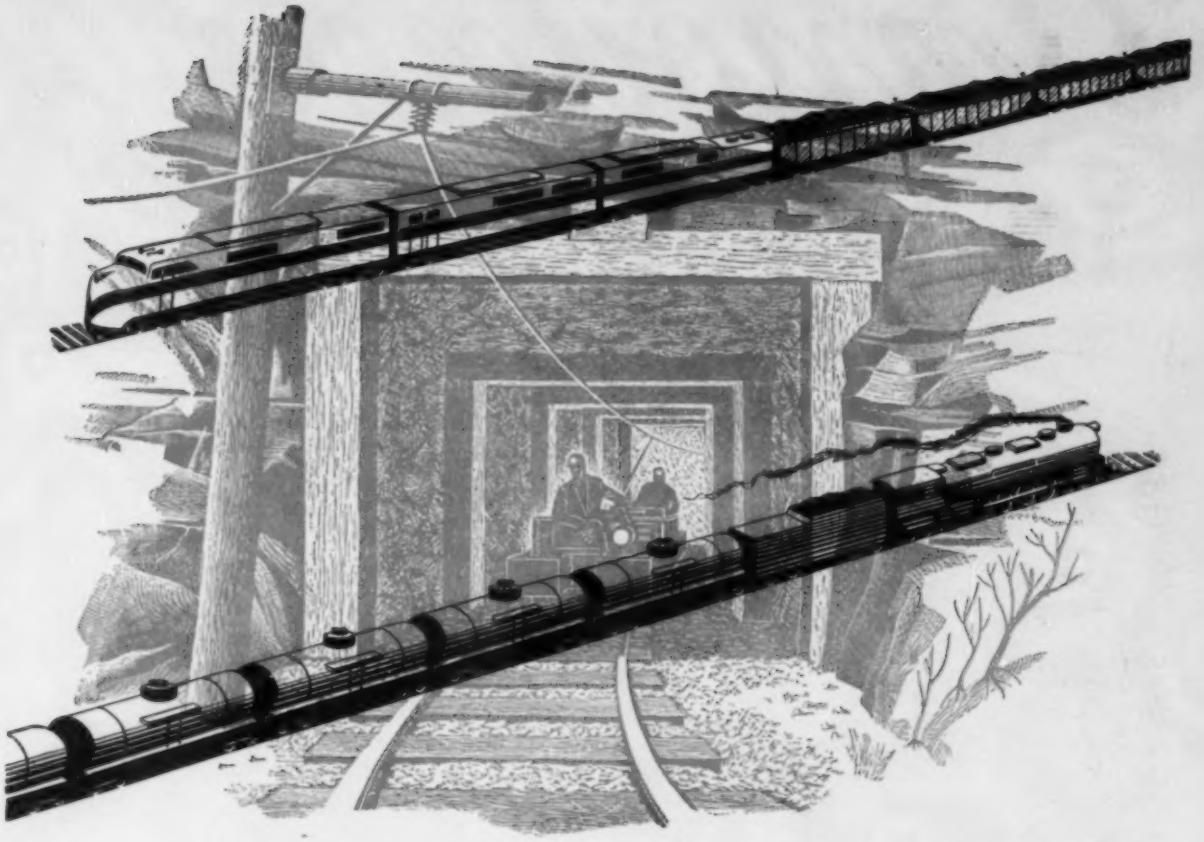
(26) PUMP FUNDAMENTALS—New 12-p Ingersoll-Rand booklet, "Centrifugal Pump Fundamentals," is written in simple language, illustrated with easily understood diagrams and is designed to be useful to all pump operators and installation and maintenance men. It explains the principles of operation, defines the various terms used in pump calculations and works out typical pump problems. Form 7287, Ingersoll-Rand Co., Cameron Pump Dept., New York 4.

(27) HEAT DRYING—"New Development in the Heat Drying of Coal," a paper describing research in the use of Multi-Louvre driers for drying and pelletizing fine coal, has been published as Book 2507 by the Link-Belt Co., Chicago 1. The paper, presented at the 1953 AIME-ASME Joint Fuels Conference, was prepared by W. W. Coffin, engineer in charge, drier equipment, Link-Belt Co. It describes an extensive experiment to determine the drying characteristics of fine coal with a 20% moisture content, and the amount of pelletization possible. In addition, a plant designed to reclaim commercially suitable product from a 35-acre bituminous-coal slurry pile is pictured and described.

(28-29) DRILL TOOLS—Carboloy Dept., General Electric Co., Detroit 32, Mich., offers two booklets. Circle 28 on the postage-free card for the 17-pg Maintenance Manual CM-121 covering the maintenance of cemented-carbide mining tools, with details on basic principles of grinding and a description of grinding procedures for cutter and finger bits, roof-bolt and auger drills. Circle 29 for the 18-p catalog CM-120 which includes the full Carboloy line of standard stocked cemented-carbide mining tools. Complete data, including design specifications, is given on cutter bits, finger bits, auger drills and roof-bolting drills, along with information on mining accessories, such as: drill rods, auger steel, grinding wheels, masonry drills, jackbits, chisel-type percussive drills and stone-cutting tools.

(30) ROLLER-CHAIN DRIVES—New 52-p Catalog CD-102-B on Browning roller-chain drives features Browning roller-chain sprockets with malleable split taper compression bushings and pro-

CONTINUED



OIL serves the coal industry
COAL serves the oil industry

Much has been said recently concerning the natural competition between coal and oil . . . our two greatest sources of energy. But the fact remains that both industries always have and always will work for each other.

Cities Service research men are constantly at work designing new and better lubricants to make the coal man's job easier. What's more, Cities Service has made available to the entire mining industry expert Cities Service Lubrication Engineers. THESE MEN CAN HELP YOU. Their quick, concise lubrication survey can mean important dollar-savings and time-saving. The Cities Service lubricants that they might recommend can do the finest job throughout your operation. Why not get your free lubrication survey from an expert Cities Service Lubrication Engineer? If you're operating at maximum efficiency, he'll be quick to tell you so. If improvements can be made, he'll show you where. For his invaluable FREE services, call or write the office nearest you or the Cities Service Oil Company, Sixty Wall Tower, New York City 5, New York.

CITIES SERVICE
QUALITY PETROLEUM PRODUCTS

150-HP CAT* DW15 TRACTOR

the answer to important earthmoving needs!

Do you need a fast, four-wheel tractor that can work effectively in narrow, confined areas, yet keep pace with larger units?

The DW15 is your answer! It has ten forward speeds up to 24 m.p.h. . . . up to 31.3 m.p.h. with optional gears. With matching scraper, it carries up to 15 cu. yds. per load at these speeds. It can maneuver in tight cut, fill or haul road situations.

Do you need a wheeled tractor with power and exceptional lugging ability?

The DW15 is your answer! Its new 150-HP diesel engine is matched to its weight and capacity. Its heavy-duty clutch and transmission match the engine. Engine, clutch and transmission are designed and built by one manufacturer.

Do you need a unit that will produce all day without exhausting operators?

The DW15 is your answer! The hydraulic booster makes steering easy . . . only eight pounds of steering effort are needed. Air-boosted flywheel clutch, constant-mesh transmission, large-capacity air brakes, anti-jackknife protection and a comfortable bucket-type seat with hydraulic snubber provide the operator with safe, easy operation.

Do you need a tractor that will give you a profitable day's production, day in and day out?

The DW15 is your answer! Designed and built by Caterpillar, it is available with a complete line of matched units . . . scrapers, bottom dump and side dump wagons.

Call your Caterpillar Dealer today. He'll give you complete details on this new high-production, high-speed earthmoving machine. He'll show you the DW15 in action.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

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NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

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...TO GET MORE INFORMATION on products and bulletins mentioned in this Equipment News Section or for data on any product advertised in this issue. Circle item numbers, fill out and mail.

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Please send me catalogs or further information about the items from the Equipment News Section whose numbers are circled. (July, 1954)

1	6	11	16	21	26	31	36	41	46	51	56	61
2	7	12	17	22	27	32	37	42	47	52	57	62
3	8	13	18	23	28	33	38	43	48	53	58	63
4	9	14	19	24	29	34	39	44	49	54	59	64
5	10	15	20	25	30	35	40	45	50	55	60	65

In addition, please send me data on these OTHER products advertised in this issue (give name and page number) .....

Name (Print) ..... **Position** .....

Company .....

Address .....

NOT GOOD if mailed after Sept. 1, 1954

vides detailed specifications, dimensions, etc., on a wide range of stock chain, sprockets, attachments, etc. The catalog includes tables presenting hundreds of practical stock drive combinations already worked out for convenient selection, as well as various engineering data and tables for drive design and specification. Offered by the Browning Mfg. Co., Maysville, Ky.

(31) **WIRE-ROPE**—John A. Roebling's Sons Corp., Trenton 3, N. J., offers a new publication, "Wire Rope Recommendations and Catalog," designed to provide a simplified ordering plan and reference for wire-rope users. The catalog is divided into 16 sections, such as, mining, excavators and dragline ropes, etc., with detailed information on wire rope for specific requirements in each. It utilizes the new Roebling plan for ordering by code numbers for the different sizes and types of wire rope already implemented by Roebling distributors throughout the country.

(32) **SLURRY PUMPS**—16-p Catalog 953 offering detailed construction and application data on "Hydroseal" pumps designed for handling sand, slurry and other abrasive materials is offered by Allen-Sherman-Hoff Pump Co., Wynnewood, Pa. Full data on performance, sizes, capacities, dimensions, etc., are provided for units ranging from 10 to 12,000 gpm.

(33) **ELECTRICAL CONNECTORS**—84-p Industrial Catalog 20 available from Burndy Engineering Co., Inc., Norwalk, Conn., contains detailed information on a broad line of electrical connectors, including connectors for cable, for flat bar and for grounding. Application features, dimension drawings, cable sizes, ratings and other specification data are provided for each of the various types.

(34) **DRIER-COOLER** — The effective application of the Link-Belt Roto-Louvre as a drier, cooler or drier-cooler is covered in a new 20-p Book 2511 offered by the Link-Belt Co., Chicago 1. One section provides comprehensive coverage of the principles of drying and cooling and the fundamental physical laws of heat transfer, as applied by the Roto-Louvre, and other sections cover temperature and dust control, dimensions, typical layouts, etc.

(35) **AIR COMPRESSORS** — New Schramm Bulletin 125 covering three distinct types of air compressors provides complete details, specifications and recommendations on the "Pneumapower," the self-propelled "Pneumatractor" and the "Unistage" models. The units represent simplified compressor design, fewer parts and fuel savings up to 50%, it is said. Offered by Schramm, Inc., West Chester, Pa.

(36-37) **SCRAPERS** — Mechanical and performance features of the A-C Models TS-200 and TS-300 "Motor Scrapers" and "Motor Wagon" Models TR-200 and TW-300 are described in detail in two new catalogs available from the Tractor Div., Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. Circle 36 on the postage-free card for Catalog MS-452 which covers the TS-300 and TW-300 units; and Circle 37 for Catalog MS-453 covering Models TW-200 and TR-200. In addition to specifications and other data, in-the-field photographs show the units' performance ability, versatility and efficiency.

(38) **AIR COMPRESSORS** — Joy Mfg. Co., Pittsburgh 22, offers a new 36-p Bulletin A-72 on Joy series 100 Class WN-114 heavy-duty air compressors, covering seven models as a single unit for displacement capacities from 1,186 to 1,948 cfm, as well as twin units which furnish up to 3,896 cfm. The Joy WN-114 is a 2-stage, double-acting compressor of 4-cylinder semi-radial design available with flange-mounted, V-belt or direct-connected drive.

(39) **MOTORS**—Designed to help in quickly choosing Reliance squirrel-cage induction motors, both the new and current line, for applications ranging from 1 to 200 hp, a 12-p "Motor Selector" is offered by the Reliance Electric & Engineering Co., Cleveland 10, Ohio. The new Bulletin B-2102 lists performance characteristics, construction features, dimensions, price and other data for ordering the "right motor for the job."

(40) **VARIABLE DRIVES**—A complete line of packaged speed-variator drives from 1 to 200 hp is described in new Bulletin GEA-6127 available from the General Electric Co., Schenectady 5, N. Y. The 20-p publication explains and illustrates the operation and application of the basic speed variator and the many additional features available.

(41) **COUPLINGS** — Folder from the Dowty Corp., New York 4, offers construction and specification details on the Dowty self-sealing couplings, said to be designed as fully leakproof for hand-coupling without tools and suitable for use with a wide variety of mineral-based and other fluids in systems up to 3,000 psi.

(42) **GRAVITY CONCENTRATION**—"Denver-Wilfley Concentrating Tables," Bulletin T1-B3, is available from the Denver Equipment Co., Box 5268, Denver 17, Colo. It explains how the tables are used to treat materials subject to gravity concentration, with specifications and construction features, and their application in the flowsheet.

(43) **FLOTATION**—American Cyanamid Co.'s Mineral Dressing Dept., New York 20, offers its latest bulletin on Cyanamid reagents, "Mineral Dressing Notes" (Bulletin 20). It describes the properties and applications of various Cyanamid chemicals and flotation practice for various metallic ores and nonmetallic minerals, along with tables summarizing usage and handling of various flotation chemicals and a selected flotation bibliography.

(44) **COMPRESSORS, PUMPS, ETC.**—Gardner-Denver Co., Quincy, Ill., offers a compact catalog covering its complete line of centrifugal pumps, stationary and portable compressors, rock drills and pneumatic equipment and accessories used in mining and other industries. Designed in a handy easy-to-use form, the catalog provides condensed basic information and specifications for each product or group of closely related products.

(45) **GEARED MOTORS**—Belgian Electric Sales Corp., New York 17, exclusive sales and service organization for Belgian-made ACEC electric motors and SADI speed-reducing equipment in the United States and Canada, has available a new 14-p Catalog CC-14A. Covering the ACEC-SADI line of geared motors built to NEMA specifications from ⅛ to 15 hp, the technical brochure includes a complete price list, dimensions, operating characteristics and diagrams.

FIRST CLASS
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NEW YORK, N. Y.

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McGRAW-HILL PUBLISHING CO., INC.
THE EDITOR, COAL AGE
330 WEST 42nd STREET
NEW YORK 36, N. Y.

(46) SCREW CONVEYORS—Industrial Div., Continental Gin Co., Birmingham 2, Ala., offers a new Screw Conveyor Catalog and Engineering Data Book ID-541. In addition to detailed specifications, it also includes engineering data to guide the user in the proper selection of conveyor and accessories, with tables and other data for determining the proper speeds and horsepowers.

(47) PLUG VALVES—New 24-p Reference Book 39-5 shows Homestead lubricated plug valves in full-port and venturi types, sizes up to 14 in, and with a choice of self-seald two-piece plug or one-piece plug designs. Engineering information includes principal dimensions, types of control, metals, lubricants, etc. Available from the Homestead Valve Mfg. Co., Coraopolis, Pa.

(48) FUSES—Booklet 16-74 on Type CLF current-limiting fuses is offered by General Electric's Construction Materials Div., Bridgeport 2, Conn. Information given includes: Where and why the fuses should be used; construction details, ratings, dimensions; curves showing current-limiting characteristics and melting time-current characteristics for both 250- and 600-v fuses.

(49)—TURBIDITY MEASUREMENTS—Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia 44, offers revised Instrumentation Data Sheet 10.14-5 on continuous indication and recording of turbidity measurements. The new data sheet describes the applications of ElectroniK potentiometers with the new turbidimeter developed and sold by General Electric special products section.

(50)—MOTOR STARTERS with short circuit protection for 2,200- to 5,000-v systems are described in new Booklet 1062 available from The Electric Controller & Mfg. Co., Cleveland 4, Ohio. The booklet illustrates starters using the EC&M 50,000-kva interrupting capacity Type ZHS contactor; also, Valimitor starters designed to safely interrupt the circuit from a bus of unlimited capacity.

(51)—pH MEASUREMENT — Catalog EN-S5 covers the complete L&N electrode line, chemicals for electrode servicing, and auxiliary electrode equipment, and is designed to present electrode assemblies for measurement, recording, and/or control of solution pH and redox potentials. Available from Leeds & Northrup Co., Philadelphia 44.

(52) MOTORS—The Lima Electric Motor Co., Lima, Ohio, offers a bulletin describing the new Type EX explosionproof and Type ED dusttight motors, manufactured in ratings of ¾ to 20 hp in NEMA Frame Sizes 224 to 326, inclusive, for operation on 2- or 3-phase, all commercial frequencies and voltages below 600. The Type EX is a totally enclosed, fan-cooled, explosionproof, UL approved motor for Class I, Group D Service; and the Type ED is totally enclosed, fan-cooled, dusttight and UL approved for Class II, Groups F & G Service.

(53) VALVES—Circular 503 describes Lunkenheimer iron-body bronze-mounted grooved-end valves for grooved-end couplings available in 2½- to 8-in sizes in standard 200-lb W. O. G. gate-valve patterns and in a 2-in size 225-lb W. O. G. "King-clip" pattern, to provide a greater pipe-line flexibility while reducing labor costs. The circular, complete with dimensions and price list, is available from the Lunkenheimer Co., Box 360, Cincinnati 14, Ohio.

(54) PERFORATED STEEL SHEETS AND PLATES—Bulletin illustrates perforated patterns available for shipment from stock, and other patterns supplied perforated to order from carbon and stainless-steel sheets and plates, for safety, ornamental and screening purposes, etc. How-to-order information along with typical layout covers all specification details. Offered by Joseph T. Ryerson & Son, Inc., P. O. Box 8000-A, Chicago 80.

(55) GAS REGULATORS—Air Reduction's complete line of regulators for oxygen, acetylene, propane and various other compressed gases is fully described in new 36-p Catalog 806. Cylinder, manifold and pipe-line regulators are illustrated, with complete descriptions, specifications and operating data. Available from Air Reduction Sales Co., New York 17.

(56) PINCH VALVES—General Rubber Corp., Tenafly, N. J., offers Bulletin 345 detailing its complete line of replacement pinch valve bodies, Type 1000, flanged, and Type 2000, slipover pipe type, manufactured in rubber, neoprene, butyl, Buna S, Buna N, and other special compoundings for specific services.

(57-58) SPRAY AND SUCTION HOSE—Quaker Rubber Corp., Div. of H. K. Porter Co., Philadelphia 24, offers separate bulletins providing full application details and specifications on two lines of hose. Circle 57 on the postage-free card for the spray-hose bulletin describing specific hose for each type of application. Circle 58 for bulletin describing suction hose for use in mines, quarries, construction jobs, pumping, etc.

(59) PIPE-REPAIR CLAMPS, service saddles, valve and bibb reseaters, bibb seat dressers, pipe benders and boss hickeys and other items in the Skinner line for the repair of all types of leaks are covered in Catalog 54. Skinner-Seal clamps may be quickly applied by one man as a lasting repair under any pressure or temperature, the company reports. Catalog from the M. B. Skinner Co., South Bend, Ind.

(60) STEEL CASTINGS—New 32-p booklet covering the entire process of steel-casting manufacture from the design and engineering phase to final applications is available from the Lebanon Steel Foundry, Lebanon, Pa. A brief history of the Lebanon Steel Foundry and the early development of its Circle-L castings is included.

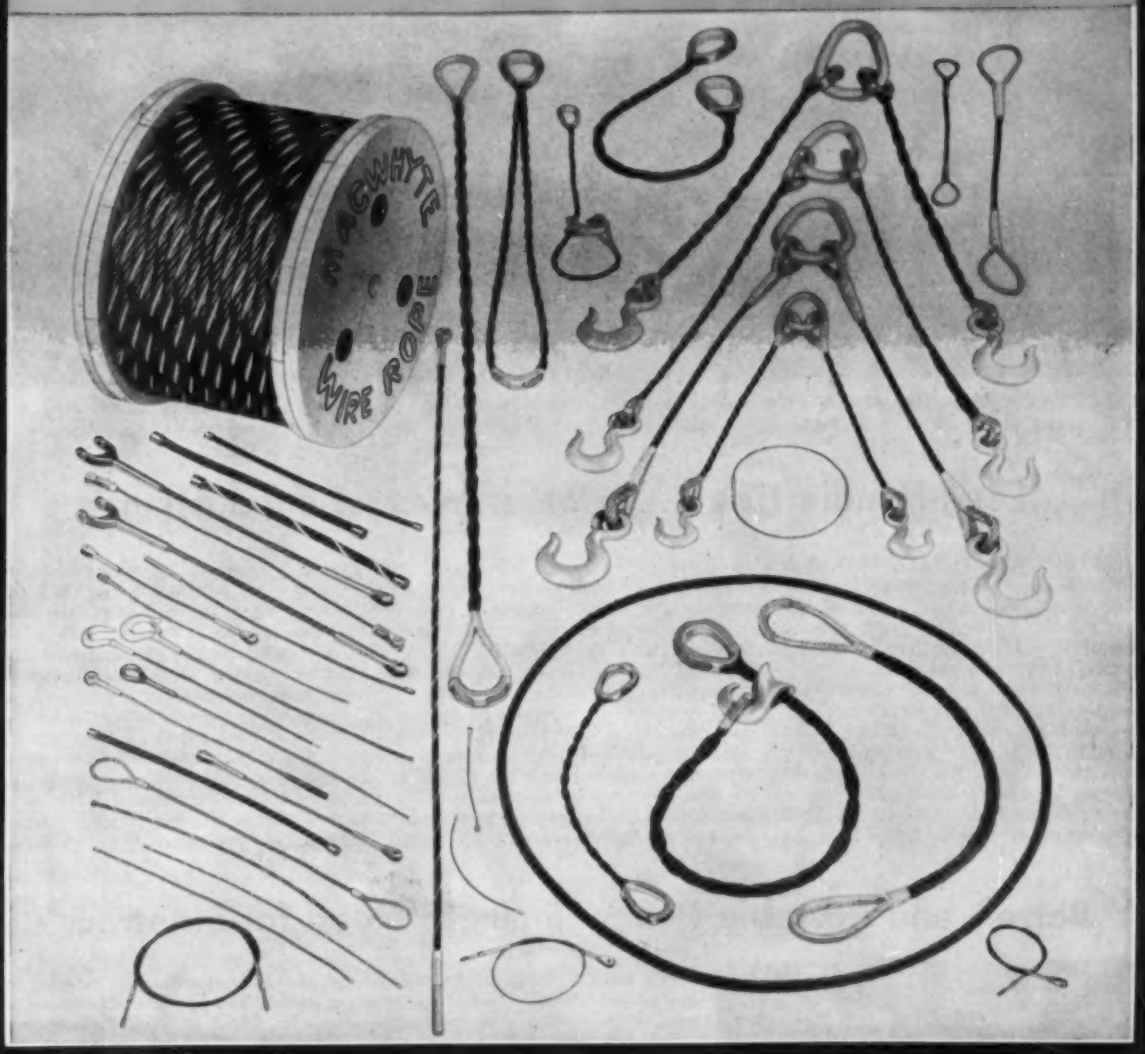
(61)—ARC WELDING—16-p Catalog ADC-709B offered by Air Reduction Sales Co., New York 17, covers in detail features of the Heliwelding process to join light gages of the "hard-to-weld" metals rapidly, inexpensively and efficiently, the equipment used with it and manual, semiautomatic and automatic applications, company says.

(62)—FAULTFINDER—Parr Mfg. Corp., Newark 5, N. J., has issued a new booklet describing in detail the Brunt Faultfinder, a combination ground detector and fault locator for use on normally ungrounded electrical circuits up to 550 v.

(63)—DUMP HOISTS—Hydraulic Hoist & Steel Dump Body Manufacturers Association, Washington 6, D. C., offers a new "Hoist Classification Chart" compiled by its engineering committee. The first chart of its type in the industry, it is designed to provide a means of standardizing capacity ratings and as a convenient method for comparison of hoists. Also included is a table for determining the size or rating of hoist needed for any anticipated use.

(64)—GAS REGULATORS—Folder R53 provides detailed data on the new K-G regulators available for use with most compressed gases in a wide range of pressure and volume requirements. Available from the K-G Equipment Co., Inc., Box 538, Allentown, Pa.

Save time and money with Macwhyte wire rope products



Above are shown only a few of the wire rope products made by Macwhyte. Wire rope is available in a thousand and one types and sizes. Also available are hundreds of types of Braided Wire Rope Slings, assemblies, and many types of aircraft control cable, terminals and tie-rods.

Save time and money by getting the proper wire rope product for your needs. Macwhyte engineers will gladly consult with you, and make recommendations based on years of experience. Catalogs are available.

MACWHYTE COMPANY
2931 Fourteenth Avenue
Kenosha, Wisconsin

Manufacturers of Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal, Stainless Steel Wire Rope and Wire Rope Assemblies. Mill depots: New York • Pittsburgh • Chicago St. Paul • Fort Worth • Portland • Seattle San Francisco • Los Angeles Distributors throughout the U.S.A. 1058

OPERATING IDEAS

SAFE WAY—Bugdusting with a wide mortar hoe, man can stand about 9 ft back of the face.

WRONG WAY—On his knees and with his back to the face, worker is in real danger from face or roof falls.

Long-Handle Hoe . . . A Safer Way of Bugdusting

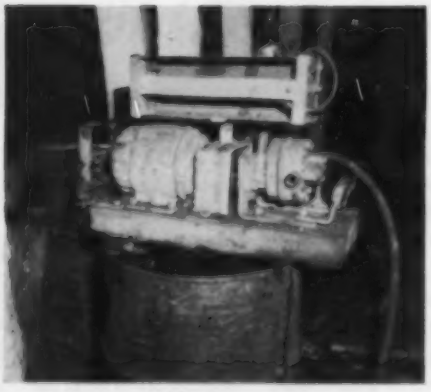
"IF IT'S NOT THE SAFE WAY, it is not the right way," emphasizes the *Peabody People*, the employee magazine of the Peabody Coal Co., in reporting on the use of a wide mortar hoe as a safer method of bugdusting at the face.

With the hoe, and working erect if the coal height permits, a man can stand back about 9 ft from the undercut face and is in much less danger from coal falling from the face. On the other hand, the man on his knees with his back to the loose undercut face is subjecting himself to unnecessary hazards since he is in grave danger from any fall of coal or loosened roof that may occur. Some cutting-machine helpers have been injured in attempting to get out of the way of falls and have been knocked into, or stumbled into, the moving chain on the machine, the publication points out.

As a group, the miners who operate cutting machines have a record of fewer accidents probably than any other class of worker employed near the coal face, no doubt because of more training, an awareness of the hazards and greater precautions, the magazine says. But even so, it reports, there were 60 cutting-machine men injured at its mines during 1953. Of these, 30 were hurt by falls of face coal and falls of roof at the face. Fifteen of these 30 machine men were injured while working on their knees shoveling dust away from the cutterbar.

Since, when the coal face is undercut, a greater stress is put on the unsupported roof, it is of the utmost importance that, in addition to safe working methods, the roof be thoroughly sounded while men are working in the face area, the magazine reminds its readers.

Barrels and Portable Pump Eliminate Need for Sidetrack



A PORTABLE PUMP using water delivered in 50-gal barrels proved cheaper in settling dust on shuttle-car roadways than a water car in Mine No. 1-C of the Amherst Coal Co., Amherstdale, W. Va. In this mine, shuttle cars discharge via elevator into mine cars, and with the new sprinkling arrangement it is no longer necessary to install a switch and sidetrack near the elevator to park a track-mounted water car.

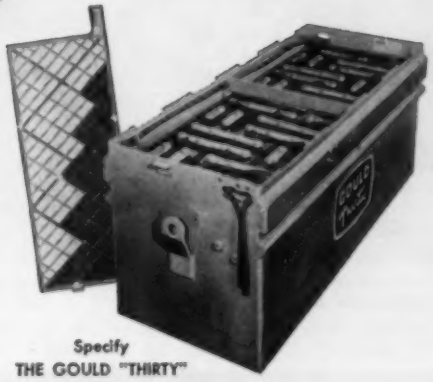
As shown in the photo, the portable pump is light enough so that two men can handle it, that is, set it in a shuttle car when sprinkling roadways farther than 250 ft from the elevator. That distance represents the length of discharge hose ordinarily supplied to a section. The portable unit consists of a 1-hp 250-v DC motor direct-connected to a hydraulic pump from a Joy loading machine.

The practice is to bring in four or five steel drums of water in a mine car and unload them at the elevator. For sprinkling the roadways beyond reach of the hose, the pump and a barrel or two of water are placed in a shuttle car and the sprinkling done from it.

In addition to eliminating practically all the road dust, adequate sprinkling helps make a smooth roadway, thus saving power and maintenance.

Springs into Action . . .

THANKS TO BATTERY POWER!



Specify
THE GOULD "THIRTY"
with New Diamond "Z" Grids—
America's Finest Mining Battery

Battery power is the most dependable mine shuttle car and locomotive power available today. It is amazingly efficient because it springs into action instantly, transmitting energy to the wheels with a minimum of moving parts, a minimum of friction. That's why battery-powered cars and locomotives have in-service records that are unequalled. There's *no* power like battery power. There's *no* battery power like the Gould "Thirty" with new Diamond "Z" Grids.

Always Use Gould-National Automobile and Truck Batteries

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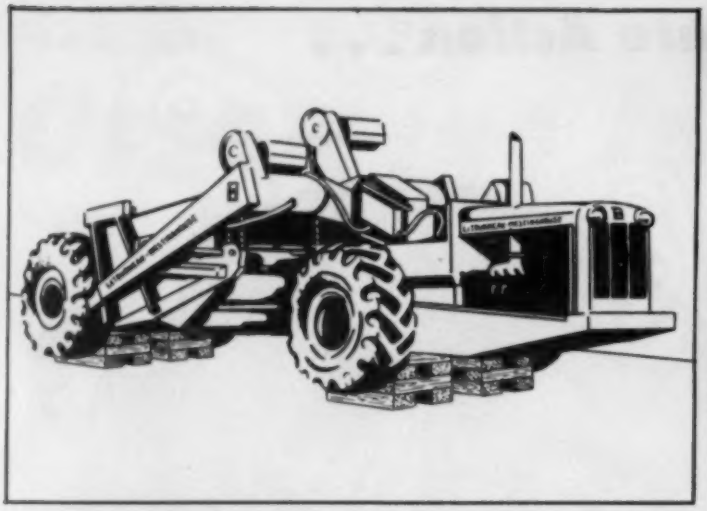
GOULD BATTERIES

GOULD-NATIONAL BATTERIES, INC.
TRENTON 7, N. J.

For Railroad Air Conditioning and Lighting | For Mine Shuttle Cars and Locomotives | For Electric Industrial Trucks | For Diesel Locomotive Starting | For Standby and Emergency Power



DEADLINED EQUIPMENT should be blocked up to remove weight from tires and air in tires should be reduced to half normal pressure.

TIRES stored outside should be set up on wood platforms and well covered.

How to Store Rubber Tires to Prevent Damage

PROPER STORAGE OF RUBBER TIRES is important if the maximum life built into the tires is to be fully realized. According to *BIG* magazine, a quarterly publication of the Goodyear Tire & Rubber Co., and the LeTourneau-Westinghouse *Co-Operator*, time alone is not the major factor in the deterioration of rubber goods. Light, heat, moisture, air in motion, ozone, oils, dust and dirt are the real culprits. Here's a checklist of hints on tire storage, compiled to help you get more value out of your tire investment:

1. Keep tires in a place where they are not exposed to light from windows, doors, skylights or other openings. If necessary, paint the glass in such openings to reduce to a minimum the amount of light entering the storage room.

2. New tires should be kept away from radiators or other heaters. Best storage temperature is from 40 to 60 F.

3. Keep the storage area as dry as possible. Moisture speeds the deterioration of tire cords. Never mount a tire that is wet on the inside. Dry it completely first.

4. Oxygen contributes to deterioration of tires. Since air currents replenish oxygen, try to make the storage room draft-free.

5. Don't store tires near operating electrical equipment, such as, motors, generators, switchgear and so on. These units produce ozone, which is particularly hard on rubber.

6. Stack your tires clear of the floor on a platform to keep out dust, grit and oil, and cover the stacks with a tarpaulin to keep insides of tires clean.

7. Don't pile tires in such high stacks that the bottom tires might be crushed, and always pile like sizes together.

8. Tires which must be stored outdoors should be protected by a wrapping of heavy canvas or similar material. Painting tires is not recommended.

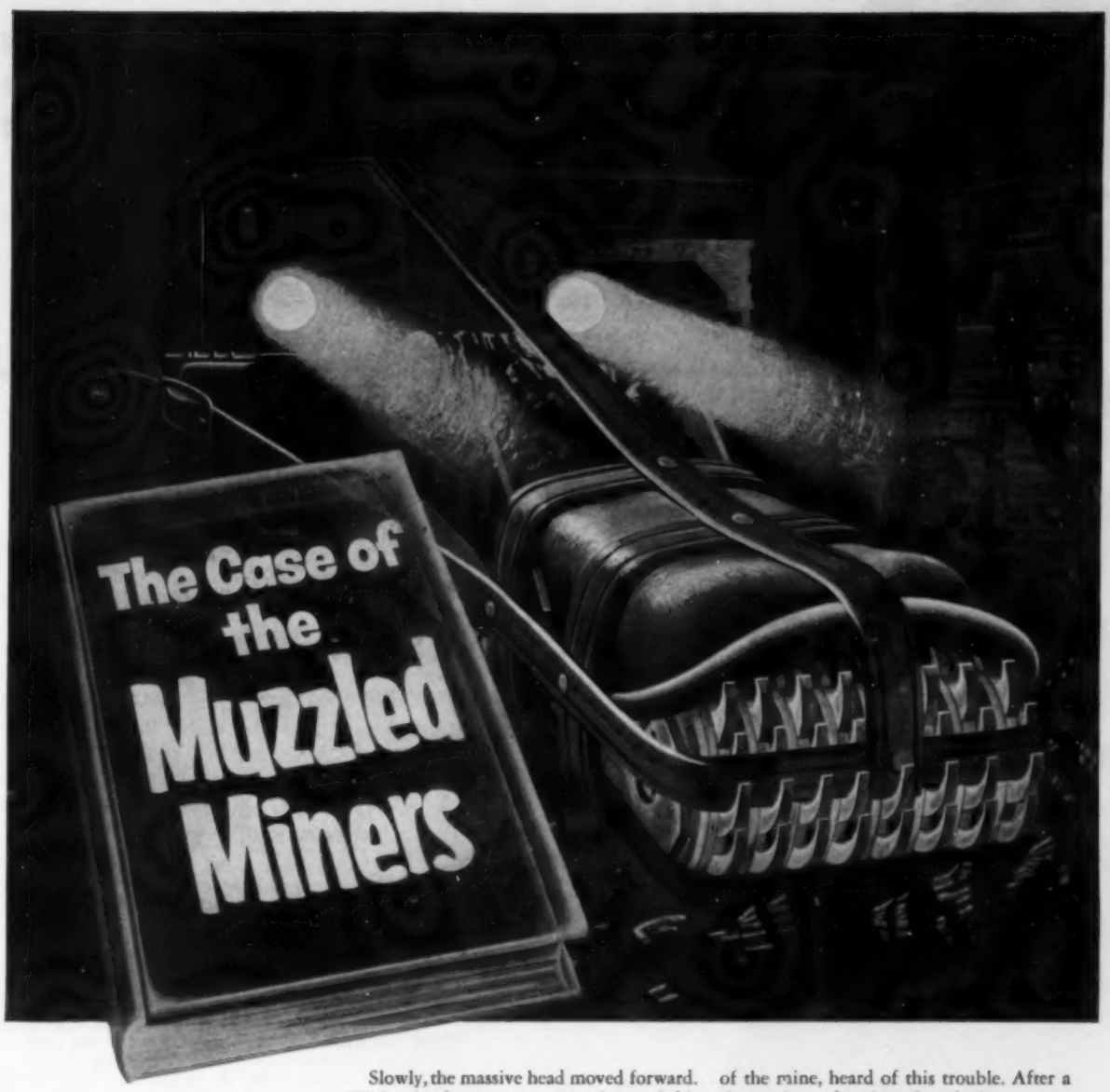
9. If vehicles are to be stored with their tires on, block up the vehicle to keep the weight off the tires and reduce air pressure in the tires to 50% of normal operating pressure. Reduce air pressure to a similar degree before storing complete wheel-and-tire mountings.

Tubes require even greater care than tires. Keep them in their original packages in dry, cool, draft-free storage. Do not inflate tubes before storing them, and don't pile deflated tubes in such a manner that the weight will cause creases at the folds. In getting a used tube ready for storage, remove the valve core to insure complete deflation, fold the tube carefully to avoid sharp kinks, then store it the same as you would a new tube.

Fumes Hood Rests on Jib Hung Below Crane Rails

INSTALLING A HOOD to exhaust fumes from above the welding benches in the Omar (W. Va.) central shop of the West Virginia Coal & Coke Corp. was complicated by the bridge crane which travels above the welding department. Neither hood nor air duct can extend more than 12 ft above the floor.

The difficulty was solved by installing an exhaust fan outside the building wall, putting a swivel joint in the duct and supporting the duct and hood on a jib. Joints of the projecting arm, duct and guy wire are on the same center line so that the hood can be swung through a wide arc that includes the two welding benches. Jib guy wires are anchored at a pivot point just below the rails of the bridge crane serving the shop. Curtains on the four sides of the hood can be let down to shield other shop workers from the arc and confine the air current to collect the fumes.



How Correct Lubrication solved it—saved $8,720 per year!

Slowly, the massive head moved forward. With a loud roar, strong, massive teeth bit into the face, tearing a ton of coal out of the solid seam in less than a minute. But all too soon, the teeth stopped spinning and the huge mechanical miner ground to a halt—"muzzled" again.

The trouble was premature wear of gears driving the teeth. This was happening to several of these machines in a large mine. Repair jobs cost up to $770 each. Reduced coal output added to these losses. But no one could find a cure.

Socony-Vacuum men, making an analysis of the mine, heard of this trouble. After a thorough study, they found the cause... water and abrasive dirt collecting in the gear case, plus an improper lubricant. They recommended the correct Gargoyle product, set up proper schedules for draining, flushing and refilling. As a result, coal production tripled between necessary overhauls, repairs dropped drastically—the mine saved $8,720 a year.

★ ★ ★

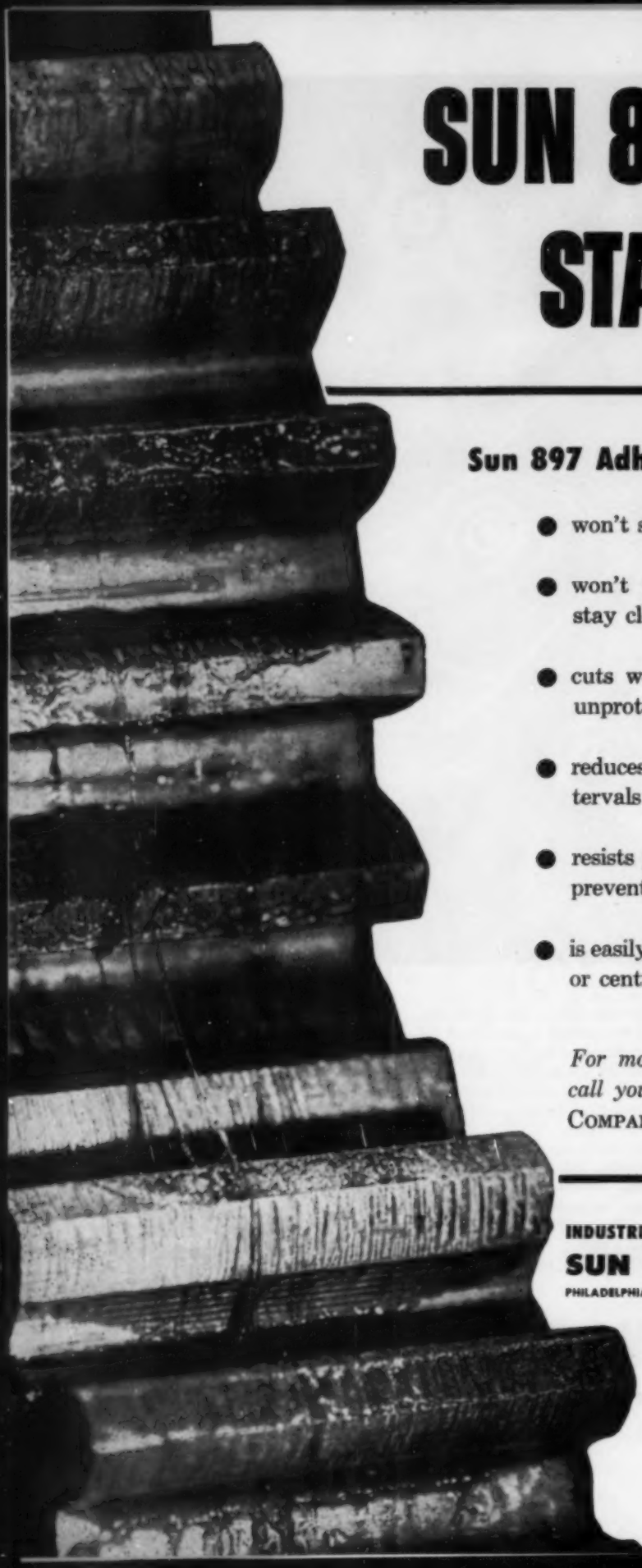
Here is another example of how *Correct Lubrication* can improve production—cut costs. Why settle for less?

SOCONY-VACUUM

SOCONY-VACUUM *Correct Lubrication*

FIRST STEP IN CUTTING COSTS

SOCONY-VACUUM OIL CO., INC., and Affiliates: MAGNOLIA PETROLEUM CO., GENERAL PETROLEUM CORP.



SUN 897 GREASE STAYS PUT

Sun 897 Adhesive Pressure Grease

- won't squeeze out under heavy loading
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COAL AGE

NEWS ROUND-UP

Utility to Replace TVA Power; TVA Coal Buying Under Attack

ANOTHER MAJOR BATTLE on the issue of public v private power appeared likely last month as a result of a Presidential directive ordering the Atomic Energy Commission to negotiate a 25-yr contract with a private utility firm to supply power that would replace that now being supplied by the Tennessee Valley Authority to an AEC installation at Paducah, Ky.

Meanwhile, mines supplying coal under contract to the TVA were facing possible cancellation of their contracts under provisions of the Walsh-Healy Public Contracts Act, on charges of unsafe working conditions and substandard wages.

President Eisenhower's order for the utilization of private power, conveyed to the AEC by the Bureau of the Budget, was revealed June 17 at a hearing of the Joint Congressional Committee on Atomic Energy. It provoked an immediate reaction in Congress and a group of Southern Democrats was reported June 22 to be seeking means to block negotiation of the private utility contract, possibly by amendment to necessary appropriations bills or by preventing passage of amendments to the Atomic Energy Act now sought by the administration. Members of the AEC reportedly are split 3 to 2 against negotiating the contract as not essential to the commission's mission, but were understood to be willing to proceed if so directed by the President or Congress.

The letter from Rowland R. Hughes, director of the budget, stated that the President directed the AEC to proceed "as rapidly as possible" to sign a "definite contract" with a group composed of the Middle South Utilities, Inc., and the Southern Co. for construction of a 600,000-kw steam plant estimated to cost $107,250,000 at West Memphis, Ark. "Use of privately generated power will avoid an outlay of about $100 million of federal tax revenue for capital investment over the next 3 yr," the letter said, pointing out that costs of the private power would be "reasonable" compared to TVA estimates when all factors, such as taxes, are considered. Annual operating cost for a private plant was estimated at $20,569,000, as compared with $16,884,000 for a TVA plant, but about 41% of the difference is composed of state and local taxes to be paid by the AEC to the private utility, it was emphasized.

In testimony, TVA officials said that the proposed plant would cost $5,567,000 more a year to operate than the steam plants the TVA has proposed but for which it has not obtained appropriations. The administration's policy was further outlined in a letter also dated June 16 from the budget director to Sen. Saltonstall (R., Mass.), chairman of the subcommittee on independent offices of the Senate Appropriations Committee. In that letter, Mr. Hughes pointed out that the President's budget message stated that arrangements were being made to reduce TVA's commitments to the AEC by 500,000 to 600,000 kw for 1957, to eliminate "the need for appropriations to finance additional TVA steam generating units at this time."

In Washington, June 17, Sen. John S. Cooper (R., Ky.) announced that he would ask the Secretary of Labor James P. Mitchell to consider the possibility of setting up "prevailing wages" for miners who produce coal used by the TVA.

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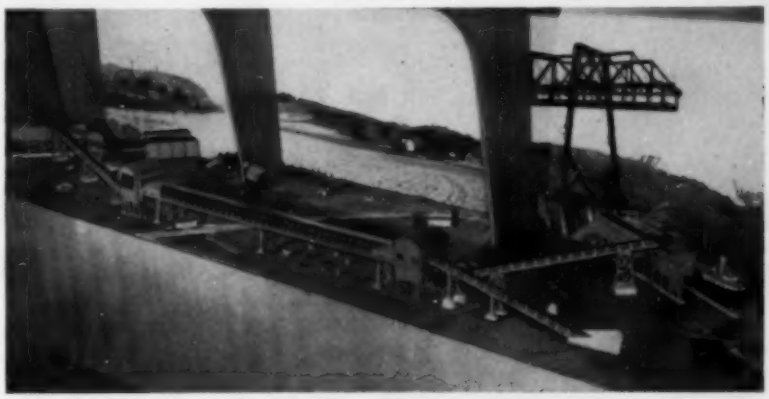


Overland Belt Model to Tour Ohio

THIS MINIATURE working model of its proposed 130-mi belt system to transport iron ore and coal between Lake Erie and the Ohio River was unveiled by the Riverlake Belt Conveyor Lines, Inc., before a group of civic leaders in Cleveland June 14. Constructed by the Goodyear Tire & Rubber Co., the 18-ft model has 6,776 working parts and required 6 mo to build. The end panels depict the modern facilities planned at the river and lake terminals and the center section shows the elevated 2-way belts operating along the 100-mi route.

The model will be installed in a specially built trailer with a glass side and displayed throughout the state as a part of Riverlake's campaign to secure Ohio Legislature. Riverlake's two previous attempts to obtain the right of eminent domain, necessary for construction of the system, were strongly opposed by railroad and other interests.

In speaking to the Cleveland group, Dr. Paul M. Zeis, vice president in charge of research for Riverlake, pointed out that with the St. Lawrence Seaway Cleveland and other Ohio cities will become seaports and maintained that the overland conveyor, when coupled with the Seaway, offers the greatest stimulus to Ohio's industrial future since the early development of the state's steel industry. The conveyor will mean savings on finished steel products at Cleveland and Youngstown of from $2 to over $3 a ton, he said.
common carrier status from the 1955

Under the Walsh-Healy Public Contracts Act of 1936, minimum wages as determined for an industry and locality must be paid by suppliers with government contracts of $10,000 or more.

Commenting on the situation, John Oliver, TVA general manager, pointed out that the TVA has no authority to set wage rates but that its contracts with coal companies stipulate that they are subject to the Walsh-Healy Act. However, he said, the act presently "has no practical effect on miners' wages" since the Secretary of Labor has never prescribed a minimum wage. According to reports, the possibilities of invoking the Walsh-Healy Act have been discussed at a conference of lawyers for the UMWA and industry management but no conclusion was made public.

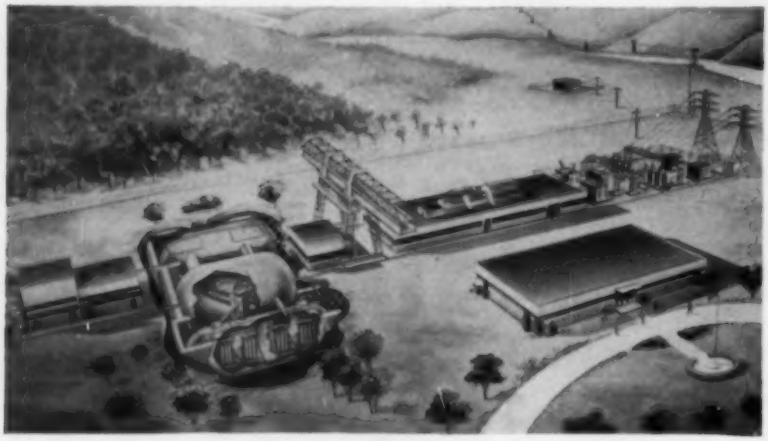
Charges against the TVA's coal-buying policies were first made public by Charles R. Griffith, president of the Southern Appalachian Coal Operators' Association (*Coal Age*, June, p 140). In a letter May 9 to Sen. Gore (D., Tenn.), Mr. Griffith charged that operators paying the union scale cannot compete for TVA business, that the TVA is using substandard operators to depress coal prices and that it does not penalize such companies for failure to fulfill its contracts. In denying those charges and in a further statement June 15, Mr. Oliver said that the TVA is creating a new market and it is up to coal operators to adjust to changed circumstances, which includes the disappearance of markets for high-priced coal.

On the safety front, the U. S. Department of Labor began hearings in Chattanooga June 11 on charges that five coal companies supplying TVA coal were violating the Walsh-Healy Act by permitting employees to work "under conditions which were hazardous and dangerous to their health and safety." Various violations of the Safety Code were charged and it was reported that eight USBM inspectors were making current inspections of the properties and were scheduled to testify before the Labor Dept. examiner June 16.

News Briefs and Trends

Miners Refuse Non-Union Work As UMWA Warns on Contract

An invitation by the Marlowe Coal Co. for miners at its Defiance and Stoker mines in Perry County, Kentucky, to return to work at prevailing union wages but without other benefits provided in the UMWA contract was receiving no takers, it was reported June 4. The Marlowe company is one of several operators which have terminated the UMWA contract and seek to re-open on a non-union basis. While there was no comment from local or district UMWA officials, it was reported that the 200 men employed at the properties were holding to the union's "No contract, no work" policy. In Pennsylvania, state police were called in to investigate the stoning June 11 of a building at one of the 22 properties that have been closed down since May 3 by picketing miners. The company reported that it was getting ready to re-open the mine when a group of 10 men appeared. No injuries were reported. Earlier on May 29, the UMWA officially served notice on operators in southeastern Kentucky that it would not let organized mines go non-union without a fight. The warning came from Sam Caddy, president of District 30, and Tom Raney, member of the UMWA International Board, at a meeting of some 300 miners, local officials and union representatives in Hazard, Ky.



How Pittsburgh's Atomic Power Plant Will Look

ARTIST'S SKETCH shows the Nation's first central station atomic power plant, to be built at Shippingport, Pa., near Pittsburgh, as a joint project of the Atomic Energy Commission and the Duquesne Light Co. (*Coal Age*, April, p 135). Westinghouse Electric Corp. is developing and building the reactor portion of the plant under contract to the AEC, and Duquesne Light will design and construct the turbine-generator portion and will operate the entire plant, designed for a minimum of 60,000 kw.

As can be seen from the cutaway, the atomic reactor providing the heat, and the heat exchangers generating the steam, will be located underground in concrete and steel structures, which will provide protection to operating personnel and the surrounding area in addition to the many protective devices in the reactor itself. The large central underground structure houses the reactor, located within the vertical cylindrical container which represents the pressure vessel. Water under pressure is pumped through this vessel, heated and pumped to the four heat exchangers, two of which are visible in the cutaway foreground. The other two are in the horizontal cylindrical structure to the rear. Heat from this pressurized superheated water converts other water to steam which is piped to the turbo-generator.

Anthracite Miners Refuse Plan Endorsed By Union Heads

Some 4,500 Panther Valley miners of the Lehigh Navigation Coal Co. refused to return to work under a company plan designed to increase output, even though John L. Lewis earlier last month had issued blunt orders for the men to resume work immediately and discuss grievances later. Lehigh Navigation closed down all mines May 3 because of excessive losses from its operations and later proposed re-opening the Panther Valley properties under a plan expected to increase output per man.

Following a board meeting June 24, the parent company announced that it would close the mines permanently, since "the coal company's finances provided us with no other course of action" after the unsuccessful attempt to get the men back on an "economically sound basis."

Included in the plan was the requirement that contract miners put in a full shift and not stop work after making their minimum wage, and that union committeemen cease assuming management prerogatives. Also, the proposal provided for the temporary or permanent layoff of about 1,000 of the 4,500 men.

All six locals first rejected the proposal but later accepted it after Mr. Lewis and Thomas J. Kennedy, UMWA vice president, told them it did not violate the contract. Many of the men, however, particularly in one local, refused to go back. Earlier, it was reported that miners of the Hazleton shaft of the Lehigh Valley Coal Co. voted late in May to work to produce 2.8 mine cars of coal a day per man, after the company had told them it would need that output to keep the mine operating. Current production was averaging 1.75 cars per man-day, an increase of 0.73 cars per day since last Feb. 15, it was said.

CAT power makes it*

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A husky 500-HP Caterpillar D397 Diesel handles the 4½-yd. bucket of this Lima shovel through a 60-ft. boom and 45-ft. stick. This shovel, working with a D397-powered Lima 6½-yd. dragline, strips overburden from United States Coal Co.'s seam of No. 8 Pittsburgh coal. The seam, near Flushing, Ohio, is roughly 42 inches in thickness and two miles square. Normal coal production is approximately 300,000 tons per year.

The Caterpillar D397, in this Lima, is a "youngster" of approximately 500 hours. Its owners have every reason to expect the same long work life and low down time that their other Cat Diesels have given them. "Very satisfactory" is the verdict of A. H. Whitaker, manager of United States Coal Co., on Caterpillar performance.

For a tough job like this, where rock must be drilled and shot, and there's a lot of dust and grit in the air, it's significant that this veteran coal operator chooses to use Caterpillar power. Really *effective* filters and seals protect the precision of every Caterpillar Diesel. Long and economical work life is built into every engine with its famed Caterpillar ruggedness of construction, and such features as wear-resisting aluminum-alloy bearings and pistons and special "Hi-Electro" hardened crankshaft journals. For low fuel cost and reduced maintenance, all Caterpillar Diesels are built to deliver full and foul-free power on low-cost No. 2 furnace oil.

Your Caterpillar Dealer—who offers fast service and dependable factory parts—will help you select the right engine or electric set for *your* job. There are 12 honestly rated sizes, up to 500 HP and 315 KW. Leading manufacturers can supply Caterpillar power in their shovels, draglines, compressors and other machinery. Be sure to specify Cat power when you order new equipment, or repower.

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Coal Age Cited for Safety Activities

COAL AGE has received the 1953 Public Interest Award of the National Safety Council, a citation "made annually to public information media for exceptional service to safety." In addition to 26 other business magazines throughout the country, the NSC's 1953 award went to 28 daily and eight weekly newspapers, 72 radio and 17 television stations, two radio networks, 13 general magazines, 32 advertisers and 14 outdoor advertising companies. Consistent promotion of safety through its pages, by discussion of industry objectives, editorial comment and reporting of coal company and group activities, has long been one of *Coal Age's* basic editorial principles. While naturally deeply honored by the awards, the editors of *Coal Age* feel that at the same time the NSC citation is, to a major degree, a recognition of the many progressive industry officials whose constant though and untiring efforts have been devoted to the cause of safety.

NCA Education Committee Urges Four-Point Program

The coal industry is "neither obtaining or using its fair proportion" of mining engineer graduates, the Mining Engineering Education Committee of the National Coal Association has reported, following the latest of its meetings at engineering schools, held at Columbia University May 21-22. "In view of keen competition from sources other than the coal industry for mining engineering graduates, in recognition of the widely advertised economic condition of the coal industry, and as a result of the personal contacts established by your committee with the faculty and students of the 12 colleges already visited," the committee report urges coal executives to: (1) increase their company's participation in scholarships for mining engineering; (2) offer more summer employment to mining engineering graduates, with better opportunity for companies to select future employees; (3) place mining engineering graduates under supervisors whose attitude will be encouraging rather than discouraging; and (4) give the graduate mining engineer an opportunity to assume real responsibilities after a minimum of practical seasoning.

Supreme Court Upholds Award Against Mine Unions

A $129,326 damage award against the UMWA, District 50 of the UMWA, and the United Construction Workers, a UMWA affiliate, was upheld by the Supreme Court June 7 by a vote of 6 to 2. The Laburnum Construction Co., Richmond, Va., had previously obtained the judgment in a Virginia state court on the basis that "brute force" had been used to shut down its construction of a coal tipple in Kentucky and that it "was, in fact, run out of Kentucky." The company had a contract for construction of a coal tipple for the Pond Creek Pocahontas Co., in Breathitt County, Kentucky, and attempted to use AFL workers. In its suit, the firm said that a gang of 75 to 150 armed men led by a UCW representative appeared and made it plain that its men "were either going to join [the] union, get off the job or be killed."

Cash Pot for Safety Prize

An unusual safety contest with substantial cash prizes has been started by the Crow's Nest Pass Coal Co., in British Columbia, for employees of its two collieries, railroad, sawmill and bush camps. Called "Beat the Accidents Contest," it started off March 1 with $3,000 "in the pot" and will run to Aug. 19. Each lost-time accident reduces the pot by $10. At the end of the period, all employees without a lost-time accident who have worked 90% of the shifts available will have their names placed in a barrel from which three winners will be drawn. First prize is 50% of the money left at the end of the contest, second prize 30%, and third, 20%.

Commission Named to Supervise New Kentucky Strip-Mine Law

Appointment of Orville W. Chinn as director of the new Strip Mining and Reclamation Commission to superivse provisions of the law passed by the 1954 Kentucky General Assembly was announced late in May by Gov. Lawrence W. Weyherby. Other members of the

Continued on p 144

Safe Foremen Tour Washington At Red Jacket's Expense

IN RECOGNITION of outstanding records of 5 yr of supervision without a lost-time accident on their sections, the Red Jacket Coal Corp., Red Jacket, W. Va., in May sent five of its foremen to Washington, D. C., for a 2-day sightseeing tour with all expenses paid. Recipients of the trip shown on the Capitol steps were: W. M. Harlow (left) and Curt Matney, Keen Mountain mine; Orville Godfrey, Coal Mountain mine; Ira Bradford, Wyoming mine; and H. B. Artis, No. 17 mine. While in Washington, the men were commended by officials of the USBM and by Harry Gandy Jr., director of safety for the National Coal Association. The all-expense tour was in addition to the other honors the men received at Red Jacket's annual safety dinner.

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USES O-B TROLLEY SHOES

New, powerful 50-ton mine locomotive is able to pull 110 of Mathies' loaded mine cars (1,600 tons) on straight level track; hauls normal loads of 45 to 50 cars against a 2% grade.

O-B Type-M Trolley Shoes have been selected to handle the extra heavy currents required for the locomotive's four 150-horsepower motors.

Curved bearing on O-B Shoes keeps them in full contact with trolley wire at varying heights and high speeds...while proper depth of groove assures positive "following action."

Exclusive fiberglass insulation on shunt withstands high temperatures that result from hauling such heavy loads.

O-B Trolley Shoes can provide the same satisfactory service for you. Choose between the Type-M Shoe, illustrated below, which has been designed for operating on currents of 2,000 amperes and above, or the Type-L Shoe designed for the most efficient and economical service on currents below 2,000 amperes.

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W. Va. Institute, AIME Section View Late Mining Developments

CONTINUOUS MINING AND CONVEYOR TRANSPORTATION—Seated: George McCaa (left), Jamison Coal & Coke Co.; G. R. Higinbotham, Consolidation Coal Co. (W. Va.); Charles T. Holland, Virginia Polytechnic Institute; and Harry Quenon, Low Volatile Div., EG&FA. Standing: W. J. Skewes (left), Pocahontas Fuel Co.; Cleon Fowler, Christopher Coal; J. B. Long, The Long Co.

HEAVY MEDIA, DRIERS AND AUGER MINING—Seated: G. R. Spindler (left), West Virginia School of Mines; Leonard Pnakovich, District 21, UMWA; George Judy, Consolidation Coal Co. (W. Va.); and Matthew Turkovich, Island Creek Coal Co. Standing: F. P. Calhoun (left), Rochester & Pittsburgh Coal Co.; D. M. Bondurant, Compton, Inc.; DeWitt C. Snyder, Mount Hope Coal Co.

ELECTRICAL PROBLEMS RELATED TO FEDERAL LAWS, Underground Gas Storage and Underground Limestone Mining—Seated: Howard Oster (left), Ashland Mining Corp.; and H. E. Mauck, Olga Coal Corp. Standing: M. J. Ankeny (left), Bituminous Coal Operators' Association; O. L. Haught, State of West Virginia; and G. B. Kneass Jr., Sunbright Div., Foote Mineral Co.

CONTINUOUS MINING in the Pittsburgh seam, transportation behind continuous miners, auger mining, heavy-media washing, new drying methods, electrical problems relating to federal laws, underground gas storage, and underground limestone mining were subjects highlighted at the joint meeting of the West Virginia Coal Mining Institute and Central Appalachian Section, AIME, at Morgantown, W. Va., May 14-15.

Harry Quenon, manager, Low Volatile Div., Eastern Gas & Fuel Associates, and president of the institute, presided at the luncheon, at which the speaker was Leonard Pnakovich, vice president, District 31, UMWA. G. R. Higinbotham, president, Consolidation Coal Co. (W. Va.), and chairman of the Central Appalachian Section, presided at the dinner, and the speaker was L. F. Reinartz, vice president, Armco Steel Corp., and president of AIME.

Chairmen and co-chairmen of the three technical sessions were: George McCaa, general manager, Jamison Coal & Coke Co., and W. J. Skewes, chief engineer, Pocahontas Fuel Co.; Matthew Turkovich, director of preparation, Island Creek Coal Co., and George Judy, vice president, Consol (W. Va.); Howard Oster, general superintendent, Ashland Mining Corp., and H. E. Mauck, general manager, Olga Coal Corp.

GOOD EMPLOYEE RELATIONS

Employee relations, which begin at the coal face, are the basis of labor relations, said Mr. Pnakovich. Cooperation does not spring into being automatically but must be cultivated. It is up to the foreman to obtain that cooperation. Good employee relations at a plant can be gaged by lows in transfers, absenteeism and turnover. The principal concerns of the laboring man, as listed by Mr. Pnakovich in order of their importance, are: (1) job security, (2) just attention for grievances, (3) working conditions, (4) pay rates, (5) promotions on a deserving basis and with regard to seniority, (6) safety and (7) good supervision.

Mr. Pnakovich reported that supervision and employee relations are good in District 31, pointing out that prompt settlement of all disputes in the district greatly contributes to good employee relations. The men, he said, like a policy

of an open door to the superintendent's office and like "yes or no answers" rather than evasive talk. An immediate supervisor should be careful of a man's pride in his work, must deal with him as an individual, and know his likes and dislikes. A slowing down comes from low morale.

In his talk, "The Iron Ore Shortage and the Steel Industry's Answer," Mr. Reinartz described the huge investments in the development of the process for using taconite ore and in exploration and development of new ore bodies in Canada and South America, all carried on by the steel industry without government money. He presented a sound color film illustrating the development of a Canadian ore property.

CONTINUOUS-MINING EXPERIENCE

Experience with a Marietta continuous miner designed to coal-company specifications for its Pittsburgh seam were given in a paper prepared by Cleon Fowler, superintendent, and Frank R. Zachar, general superintendent, Christopher Coal Co., Div. of Pittsburgh Consolidation Coal Co., Pursglove, W. Va. The paper, read by Mr. Fowler, limited discussion to operation in Osage No. 3 mine. The two motors (totaling 140 hp, continuous rating) were overloaded to 187 hp when advancing 12 in per minute and producing 2.88 tons per minute. It has been determined that the machine preferably should have 200 hp (continuous rating) to produce a desired 5 tons per minute. Trouble with an original multiple disk-type clutch was overcome by replacement with a simple jaw clutch.

Stalling of the conveyor and traction has been remedied by installing an extra pump and larger hydraulic motors, Mr. Fowler said. Normal high tramming speed should be at least 30 fpm instead of the present 18 fpm. Cast cutter chains had to be replaced with heavier drop-forged chains. Carbide bit cost for 80,000 tons was 4c per ton, not including an extremely heavy sulphur area they now are attempting to mine. Size consist compared to conventional mining has been disappointing, but not sufficiently so to discontinue use of the miner. The ¾ x 0 runs 53.3%, as compared to 45% by conventional methods.

Roof action has been very favorable with the Marietta miner, which leaves arches on the top. Only one face fall, and that as a result of a slip, was encountered in mining 80,000 tons while leaving only shell pillars between rooms. It has not been necessary to use the roof-bolt facilities that were built onto the machine. Sixty percent recovery was attained.

Because of variations in the sulphur, the paper concluded, three sets of mining conditions are encountered in the Pittsburgh seam: (1) areas minable with continuous miners at low cost; (2) those minable with continuous miners at conventional mining costs; and (3) those impossible to mine with continuous miners.

Asked to comment on work the university is doing on the cutting of sulphur in cooperation with the Christopher Coal Co., G. R. Spindler, director, W. Va. School of Mines, and institute secretary, said that while sulphur inclusions may look the same they can vary widely in hardness. Brinnell tests show that sulphur hardness averages about 455, as compared to mild steel at 600. Rockwell tests are not suitable. No close relationship has been found between grindability and hardness. The next step will be the use of strain gages on shop tools cutting sulphur to determine the relationships between pressures, cutting speeds, etc.

Discussing the possibility of pillaring with the miner, C. R. Nailler, president of Christopher Coal, said that for 2 yr pillars have been taken successfully with a Colmol in Brock mine in the Sewickley seam, but that the same method cannot be used in the Pittsburgh seam because of the difference in roof. The Marietta miner will not be employed in pillaring for some time, but three possible ways of doing it have been considered. Where bottom has been under water several times the Marietta miner has bogged down badly and as a result it has been determined that the bottom must be dry, he said.

CONTINUOUS HAULAGE

J. B. Long, president, The Long Co., Oak Hill, W. Va., presenting a slide-illustrated paper on conveyor transportation for continuous mining, covered essentially the same points as discussed in his *Coal Age* article appearing in the February issue, p 92. He showed a number of mining plans with Piggyback and room-conveyor transportation from the continuous miner to the loading point. In answer to a question during the discussion, Mr. Long said that to carry 5 tons per minute a chain conveyor will have pans 25 in wide at the top, 15 in wide at the bottom, and operate at 155 fpm with a 25-hp motor, or at 200 fpm for long rooms with a 50-hp motor.

DENSE-MEDIA RECOVERY

Getting clean coal averaging less than 2½% ash from a R-O-M product ranging from 3 to 50% ash, with less than 1% coal in the sink or reject and less than 1% sink or reject in the coal or float product, was reported in a paper by DeWitt C. Snyder, vice president, Mount Hope Coal Co., Mount Hope, W. Va. Mr. Snyder described a 200-tph DMS single-vessel magnetite-media washer developed by the Daniels Co., Contractors, Inc., and installed to clean Sewell-seam coal at the company's Sterling-Sewell mine, Holcomb, Nicholas County, W. Va.

Specific gravity of the clean coal is 1.25 and the separation is done at 1.32. The one DMS vessel handles 7 x ¼-in coal at 200 tph, which adds up to 80% of the finished product from the mine. Total magnetite loss has been less than

(Continued on p 152)

P&R Opens Model Anthracite Mine to Public

A MODEL ANTHRACITE MINE, complete in every detail, has been installed by the Philadelphia & Reading Coal & Iron Co. in "Roadside America," a world-famous scale-model reproduction of American community life located on U. S. Route 22 between Allentown and Harrisburg, Pa. The project required more than a year to complete and is built to a scale of 3/16 in. The company's Locust Summit breaker, largest in the world, is reproduced in minute detail, as are the rotary car dump, surface plant, office building and other facilities. The mine shaft (lower left), with timbers cut to scale, is sunk into a hillside from which "the cover" has been removed to expose a cross-section of coal veins and a miniature mine with both pitch and flat mining. The project was designed and constructed by P&R staff members, including Robert C. Bader, P&R advertising artist and draftsman, Jess Bickel, a patternmaker at the company's Potts colliery, and Harry Reh, mining engineer.

INDUSTRY MEETING — A Special COAL AGE Staff-Written Report

Personal Notes

Harry A. Treadwell, vice president in charge of operations, Chicago, Wilmington & Franklin Coal Co., retired June 1 after some 38 yr of service with the company. His duties have been taken over by **F. Earle Snarr**, general superintendent for the company. Mr. Treadwell first joined CW&F in 1916 in the engineering department and held various posts, including mine superintendent and chief engineer. He was made general superintendent in 1928 and was elected a vice president in 1943.

A. H. McCoy, general mine foreman, Wharton No. 1 mines, Coal Div., EG&FA, Wharton, W. Va., retired July 1 under the company's retirement plan. Following posts as mine superintendent for several West Virginia firms, Mr. McCoy joined EG&FA in 1929 and was general night foreman at Wharton before becoming general mine foreman in 1948. **Weldon J. Baumbaugh**, a 40-yr veteran with the company, retired May 1 as general surface foreman at the Sonman mine. Mr. Baumbaugh came with the company in 1915 as outside foreman at Sonman and was promoted to general surface foreman in 1945. **V. R. Gregory**, general engineer in EG&FA's Pittsburgh engineering department, has been named property engineer, replacing **J. E. Sel'g**, retired.

Retires From 25-Yr Post With Illinois Mining Institute

B. E. SCHONTHAL last month announced his retirement as secretary-treasurer of the Illinois Mining Institute, on doctors' orders to curtail his activities. Mr. Schonthal, who heads the firm of B. E. Schonthal & Co., Inc., manufacturers' sales agents, Chicago, this year rounds out 25 yr of service to the institute in the post of secretary-treasurer and has long been regarded by fellow members as one of the mainstays of the organization. The Illinois Mining Institute now is in its 63rd year of activity.

J. A. Hunt, executive vice president since 1951, has been named president, New River Co., Mt. Hope, W. Va., succeeding the late L. Ebersole Gaines. Prior to joining the firm in 1941 as vice president in charge of operations, Mr. Hunt was associated with Lillybrook Coal Co. for 10 yr, serving as president just before his move to New River. Mr. Hunt is a veteran of more than 35 yr with the coal industry. Charles E. Mahan, New River Co. secretary, was named to the positions of vice president and general counsel, in addition to his secretarial duties.

Sinclair Coal Co., Kansas City, Mo., has retained **James Deane** to manage the reclamation of strip lands at the various operations of the company throughout the country.

Ralph A. Van Dyke, since 1942 chief engineer at the Piney Fork No. 1 mine of the Hanna Coal Co., Div. of Pittsburgh Consolidation Coal Co., recently retired after 37 yr in the coal industry. An engineering graduate of Ohio University, Mr. Van Dyke began his career in the bituminous industry in 1916, in charge of engineering for mines of the Posten Coal Co. Later, before joining Hanna, he spent about 15 yr in West Virginia as chief engineer for the Consolidation Coal Co. and Carter Coal Co.

Obituaries

Frank E. Mueller, 73, president, Roberts & Schaefer Co., Chicago, died May 21, at his home, following a heart attack. After graduating from Purdue University with a master's degree in engineering in 1900, Mr. Mueller joined the engineering department of Link-Belt Company, and became assistant to the manager, coal preparation department. In 1903 he joined the partnership of Roberts, Schaefer & Co., which subsequently became Roberts & Schaefer Co., and worked his way up progressively from chief engineer, general superintendent, secretary and sales manager, and vice president, to president in 1941. Well known throughout the coal industry for his contribution to the advancement of coal preparation, Mr. Mueller was a member of the board of governors, Manufacturers' Div. of American Mining Congress, and active in the AIME, the Illinois Mining Institute and the Engineers' Society of Western Pennsylvania.

J. F. Foreman, 67, superintendent, Gallitzin mines, Argyle Coal Co., Gallitzin, Pa., died May 30, at his home in Cresson, Pa. Mr. Foreman had been superintendent for around 8 yr.

E. F. Mauer, vice president in charge of production, Powhatan Mining Co., Cleveland, Ohio, died May 26, at Bellaire, Ohio. Mr. Mauer served as president of the Rail & River Coal Co., Bellaire, Ohio, from 1949 until November, 1951, when that company was acquired by the North American Coal Corp. Following the purchase, he became general manager of Powhatan Nos. 1, 2 and 3 mines and last fall was made vice president in charge of production for the company.

Heads Lorado Coal Mining Co.

STANLEY B. JOHNSON JR. was elected president of the Lorado Coal Mining Co., Columbus, Ohio, at the annual stockholders' and directors' meeting June 14. He succeeds Stanley B. Johnson, who was named chairman of the board. An alumnus of Wesleyan University, Mr. Johnson Jr. has been active in the company's mining operations for the last 16 yr, beginning in 1938 at the Lorado mines in Logan County, West Virginia. Following 4-yr service with the Air Force in World War II, he returned to Lorado and in 1947 was transferred to operations in Belmount County, Ohio. In 1950 he returned to Lorado and in 1952 moved to company headquarters as assistant to the president. Mr. Johnson also is a director of Lorain Coal & Dock Co.

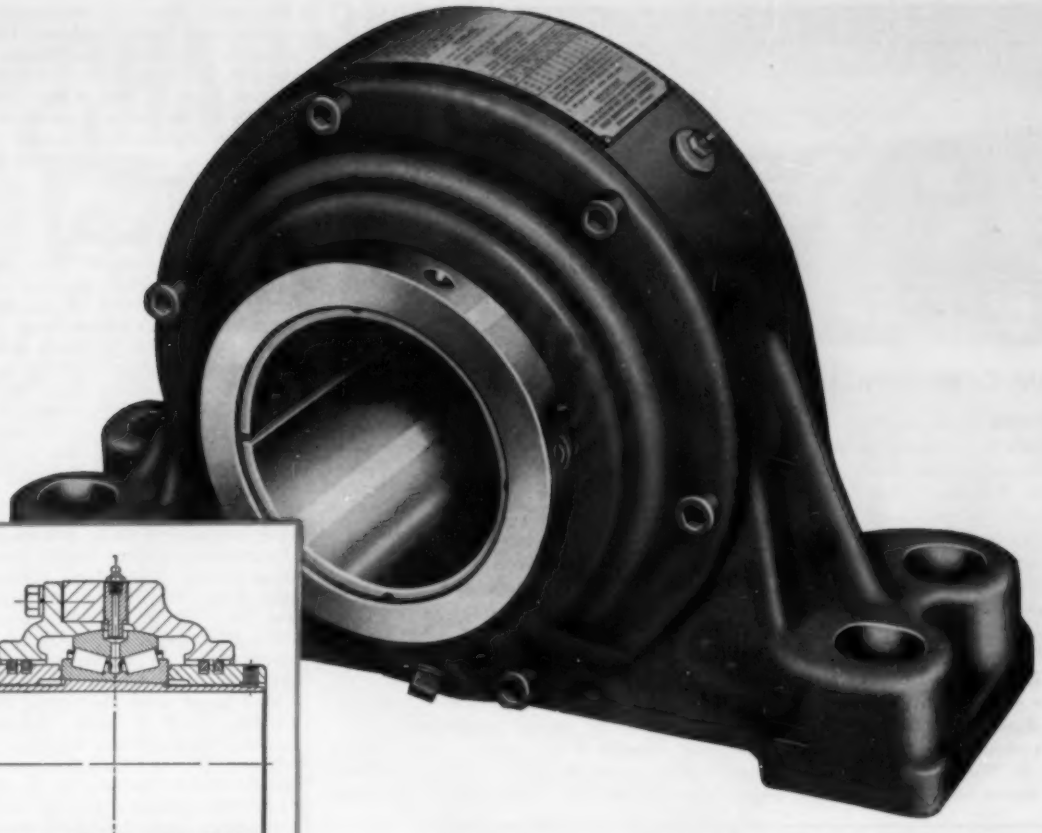
Association Activities

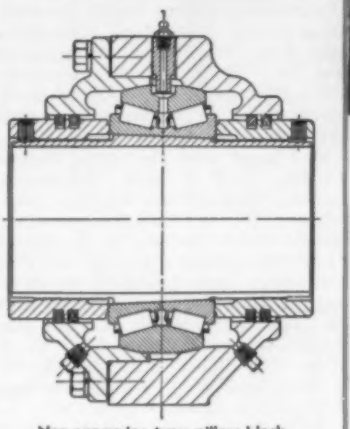
Big Sandy-Elkhorn Renames

At a meeting held June 4 in Lexington, Ky., officers of the Big Sandy-Elkhorn Coal Operators' Association were reelected to serve another year as follows: W. W. Goldsmith, president; V. D. Picklesimer, vice president; C. W. Davis, executive secretary, and L. B. Brashear, treasurer. Directors named include: C. M. Caudill, G. O. Tarleton, D. A. Zegeer, Mr. Goldsmith, N. D. Howard, G. E. Evans Jr., D. S. Knausz, J. J. Foster, B. L. Francis, William Crawford, Harry Laviers, Mr. Picklesimer, A. H. Mandt, B. F. Reed and L. W. Barco.

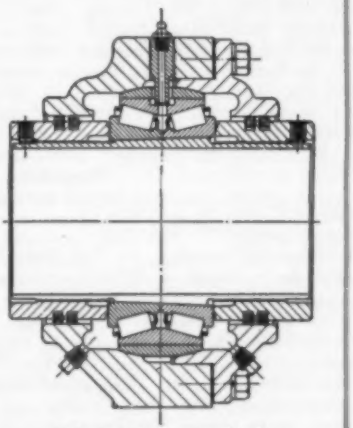
New Holmes Council Formed

At an organizational meeting, held in Mullens, W. Va., in May, Fred R. Deal, district inspector for the state department of mines, was elected to head the newly formed Wyoming Council of the





Non-expansion type pillow block



Expansion type pillow block

How the new Dodge-Timken All-Steel pillow block gives you more load capacity in less space

HERE'S the new "All-Steel" pillow block that's making an outstanding record in heavy-duty applications. It takes up less space. It weighs less. Yet this Dodge-Timken All-Steel pillow block has tremendous load-carrying capacity. It is available in both expansion and non-expansion design. And it incorporates all the advantages of Timken® tapered roller bearings.

Because of their tapered construction, Timken bearings take radial and thrust loads in any combination. Line contact between rollers and races gives Timken bearings greater load-carrying capacity. And the Timken bearing in this pillow block is of new design, with tapered bore and self-aligning spherical outer race.

Timken bearings are made of the finest steel ever developed for tapered roller bearings—Timken fine alloy steel—and under normal conditions will last the life of the machinery with which the pillow block is used.

Timken bearings make any machine better. Always look for the trade-mark "Timken" on the bearings in the machines you buy or build. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

NOT JUST A BALL ◯ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◫ AND THRUST →◫← LOADS OR ANY COMBINATION

N&W Coal-Burning Locomotive Now on the Rails

PERFORMANCE of the Norfolk & Western's new experimental coal-burning, steam turbine-electric drive locomotive delivered May 19 will be watched with considerable interest by both the coal and railroad industries. It reportedly operates at about double the efficiency of the average coal-burning reciprocating steam locomotive, and in coal-producing areas can compete favorably with the diesel-electric since its comparative economy depends on the relative costs of coal and diesel fuel. Rated at 4,500 hp, the Baldwin-Westinghouse unit incorporates a Babcock & Wilcox high-pressure water tube boiler with Westinghouse steam turbine and electric drive and embodies the best designs from modern stationary and marine power plant practice than can be adapted to railroad service.

The new locomotive has a 6-6-6-6 wheel arrangement and with tender, fuel and water weighs approximately 586 tons. The separate tender holds 22,000 gal of water and the hopper in the nose of the locomotive carries 20 tons of coal. Over-all length is 161 ft 1½ in. Designed for a maximum speed of 60 mph, the unit is capable of exerting a maximum tractive effort of 175,000 lb, and a continuous tractive effort of 114,000 lb at 9 mph.

Joseph A. Holmes Safety Association. Other officers elected were: H. C. Dykes, president, Tralee Local Union 9375, first vice president; D. L. Haga, superintendent, Wyoming mine, Red Jacket Coal Corp., second vice president; W. O. Brogan, mine foreman, Alpoca mine, Gaston Coal Co., third vice president; Dove Arnold, timekeeper, Itmann Colliery, Pocahontas Fuel Co., secretary; and O. Easterling, superintendent, Tralee mine, Semet-Solvay Div., Allied Chemical Dye Corp., treasurer.

Tierney Heads W. Va. Assn.

Laurence E. Tierney Jr., president, Eastern Coal Co., Bluefield, W. Va., has been elected president of the West Virginia Coal Association, succeeding the late L. Ebersole Gaines, who had held the post since 1941. L. Newton Thomas, president, Carbon Fuel Co., Charleston, W. Va., succeeds Mr. Tierney as vice president of the association. Other officers of the association are R. Carl Andrews, executive secretary, and D. Holmes Morton, treasurer.

World Symposium to Evaluate Applications of Solar Energy

A World Symposium on Applied Solar Energy will be held next Jan. 12-15 under the leadership of Stanford Research Institute. Headquarters will be the Westward Ho Hotel in Phoenix, Ariz., The 4-day meeting of leading world scientific and industrial interests in solar energy utilization will attempt to evaluate present knowledge in terms of practical applications. Special sessions will be devoted to the potential use of solar energy to solve problems of individual industries, with sessions on heating water, space heating, cooling, energy storage among those scheduled. The symposium will be under the general chairmanship of Lewis W. Douglas, former ambassador to Great Britain and chairman of the board of the Southern Arizona Bank & Trust Co. Merritt L. Kastens, assistant director of Standard Research Institute, is vice chairman. Sponsor is the Association for Applied Solar Energy, formed last March 17 by a group of Southwestern industrialists, bankers, agriculturalists and educators. Henry B. Sargent, president of the Arizona Public Service Co., is chairman of the association's executive committee.

Pa. State Safety Association Elects, Sets State Meet

Officers of the Pennsylvania State Bituminous Safety Association were re elected at a meeting of the association held June 11 at Ebensburg, Pa., as follows: president, W. G. Thomas, Pennsylvania Deputy Secretary of Mines; vice president, William A. Morris, safety inspector, Baton Coal Co., McKeesport, Pa.; treasurer, M. L. Coulter, mining engineer, Indiana, Pa.; and secretary, George Resnick, Pennsylvania mine inspector, Sprangler, Pa. Dennis J. Keenan, general superintendent, Sterling Coal Co., Bakerton, Pa., was elected director of the annual state-wide bituminous first aid meet, and H. R. Burdelski, USBM, Pittsburgh, was named chief judge. The state meet will be held in Ebensburg on Saturday, Sept. 11, and it was decided that 40% of the teams participating in the district competitions would enter, thus providing approximately 32 teams for the state contest.

MEMMA Elects Officers

The following officers were elected at the annual election meeting of the central advisory council of the Mining Electro-Mechanical Maintenance Association: president, W. R. Wood, electrical superintendent, Berwind-White Coal Mining Co., Windber, Pa.; first vice president, J. W. Hunt, associate professor, mining extension, Pennsylvania State College; second vice president, M. J. Mechling, safety director, Valley Camp Coal Co., St. Clairsville, Ohio; third vice president, R. S. James, mechanical engineer, USBM, Pittsburgh.

Executive committee branch members named include: R. A. Huth, Vesta-Shannopin Coal Div., Jones & Laughlin Steel Corp.; D. R. Kriescher, inspector, USBM, Barnesboro, Pa.; A. E. Molinski, superintendent of maintenance, Johnstown Div., Bethlehem Mines Corp.; Richard Shaw, chief electrician, Harmar Coal Co.; and F. C. Smay, maintenance engineer, Westinghouse Electric Corp., Fairmont, W. Va. Executive committee council members include: M. E. Altimus Jr., assistant professor, mining extension, Pennsylvania State College; J. H. Flemming, assistant service manager, Joy Mfg. Co.; G. E. Hubrig, Central Div. manager, Wire & Cable Div., U. S. Rubber Co.; William Schroeder, Schroeder Bros.; and W. J. Veenis, sales representative, Anaconda Wire & Cable Co.

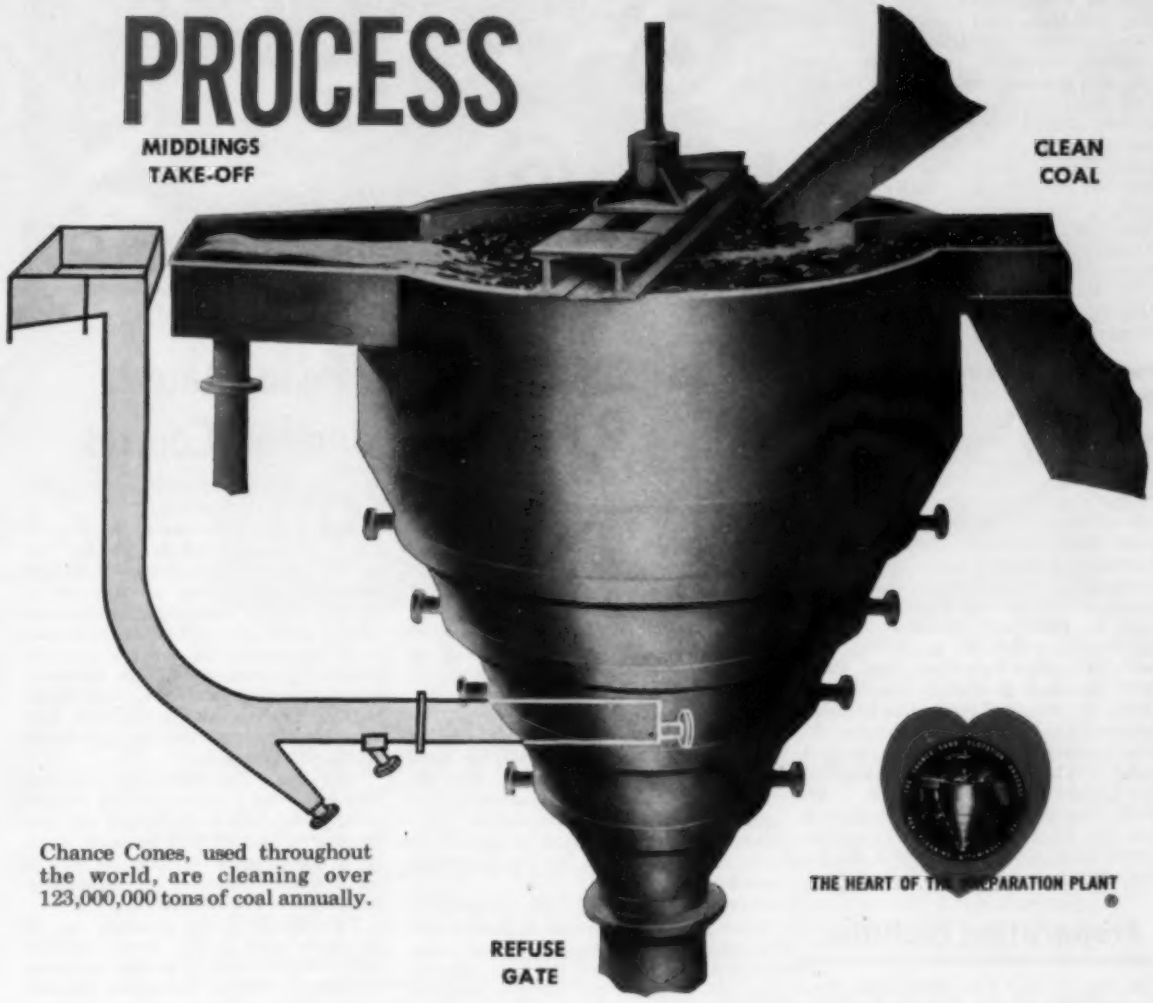
The association now has seven local branches with a total membership of approximately 1,000, holding monthly meetings from September to May at which programs on maintenance selected by the branch members are presented and discussed. Those interested in joining should contact the nearest local branch, as follows: **Allegheny Valley**—E. M. Dougherty, president, meets last Friday at Cheswick, Pa.; **Barnesboro**—George Atkins, president, meets second Friday, Legion Home, Barnesboro, Pa.; **Fairmont**—Charles Freeland, president, meets second Saturday, First Presbyterian Church, Fairmont, W. Va.; **Greene County**—Thomas Whalen Jr., president, meets second Wednesday, VFW Bldg., Carmichaels, Pa.; **Johnstown**—A. E. Molinski, president, meets second Wednesday, Masonic Temple, Johnstown, Pa.; **Monongahela Valley**—Fred Combs, president, meets second Tuesday, Community House, Richeyville, Pa.; **Ohio Valley**—Michael Duda, president, meets second Wednesday, Eagles Hall, Bridgeport, Ohio.

Lake Heads Colo. & N.M. Group

J. L. Lake, president, Osage Coal Co., Steamboat Springs, Colo., has been elected president of the Colorado & New Mexico Coal Operators' Association. J. S. Besser, sales manager, Colorado Fuel

CHANCE PROCESS

THE HEART OF THE PREPARATION PLANT



Chance Cones, used throughout the world, are cleaning over 123,000,000 tons of coal annually.

THE HEART OF THE PREPARATION PLANT

When an important unit in a coal preparation plant works *well*—easily, efficiently and economically, it needn't be given a "new look" every year. That is why Chance Cones installed today look very much like those made ten years ago.

But there *is* a difference—an important one.

Today, the Chance Process yields *3* products, not *2*. There is now a middlings take-off, adjustable from 1.30 to 1.90 gravity, that enables you to recover and market a greater part of your tonnage. Moreover, this take-off can be fitted to older, two-product Chance Cones. Your inquiries are invited.

ADVANTAGES OF THE 3-PRODUCT CHANCE CONE

- New low-maintenance method of elevating refuse
- Automatic refuse withdrawal
- Cleans coal down to 1.35 gravity
- Recovers 99% of salable coal
- Cleans wide range of coal—⅛" to 10"
- Takes off middlings up to 1.90 gravity
- One-man gravity change-over in 5 minutes
- Capacities 40 tph to 600 tph

UNITED ENGINEERS & CONSTRUCTORS INC

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WITH A BACKGROUND OF OVER SEVENTY YEARS' EXPERIENCE

and Iron Corp., Denver, has been named vice president, and O. M. Hanks, Harris Coal Co., treasurer. The association has moved to its new offices located at 728 Cooper Bldg., Denver 2, Colo.

Utah Operators Elect Officers

At its annual meeting, in Salt Lake City, the Utah Coal Operators' Association elected the following officers: president, David A. James, vice president and general sales manager, Liberty Fuel Co.; vice president, Oscar A. Glaeser, United States Fuel Co.; executive secretary, B. P. Manley. Directors named include: John Dorick, vice president and general manager, Hi-Heat Coal Co.; A. B. Foulger, general manager, Lion Coal Corp.; Mr. Glaeser; W. J. O'Connor, president and general manager, Independent Coal & Coke Co.; P. L. Shields, president, Spring Canyon Coal Co.; and L. R. Weber, president, Liberty Fuel Co.

Two Coal Company Officials Named Directors of BCR

James W. Morgan, president of Ayrshire Collieries Corp., Indianapolis, and Robert L. Hair, superintendent of fuel mines of the Colorado Fuel & Iron Corp., Pueblo, Colo., have been elected members of the board of directors of Bituminous Coal Research, Inc., Pittsburgh. Formerly associated with several coal companies, Mr. Morgan became vice president and general manager of Ayrshire in 1949 and president in 1950. Mr. Hair joined CF&I in 1912 and has held his present post since 1926. Other BCR directors re-elected were: J. N. Geyer, treasurer and production engineer, Imperial Coal Corp.; R. E. Jamison Jr., vice president—sales, Jamison Coal & Coke Co.; S. B. Johnson Jr., president, the Lorado Coal Mining Co.; S. S. Nichols, vice president, C. H. Sprague & Son Co.; Dr. Huston St. Clair, president, Jewell Ridge Coal Corp.; and R. E. Salvati, president, Island Creek Coal Co.

Preparation Facilities

K. M. F. Coal Co., Middleport, Pa.—Contract closed with Wilmot Engineering Co. for one 2½-ft diameter Wilmot hydrotator to prepare rice coal at feed capacity of 18 tph.

Blue Diamond Coal Co., Leatherwood No. 2 mine, Leatherwood, Ky.—Shipment by Deister Concentrator Co. of eight SuperDuty Diagonal-Deck coal-washing tables to handle ¼x0 coal, and one Model 108-B Concenco revolving feed distributor arranged for 8-way feed distribution to the tables.

Splash Dam Coal Corp., Splashdam, Va.—Contract closed with the Daniels Co., Contractors, Inc., for new preparation facilities handling up to 150 tph of R-O-M feed; plant to produce up to 17 sizes of coal, each size to be precision-cleaned, with plus ¼-in prepared in a Daniels DMS Dense-Media washery and minus ¼-in sizes to be prepared over air-cleaning tables; complete new screening and handling facilities to be installed.

SUPERVISORS of an anthracite company participate in a conference with Michael Zulkoski (center), supervisory-training instructor at Penn State.

441 Men Complete Penn State Mining Extension Courses

THE MINING DIVISION of Mineral Industries Extension Services, Pennsylvania State University, during the 1953-54 term enrolled 834 students from 197 communities in 13 counties in its statewide program consisting of 42 different classes in 33 class centers. Of these enrollees, 441 completed the courses in which they had enrolled, including 26 men who were awarded diplomas signifying satisfactory completion of the 3-yr curriculum in coal mining. The classes are part of the adult evening vocational program offered by local school districts in cooperation with the university and the Pennsylvania Department of Public Instruction. This completes the 61st year of service to the mining industry by the university extension services.

Also in this term, the supervisory-training staff of Mineral Industries Extension Services organized and conducted four programs for mine officials, in which 73 of the 86 men enrolled completed the work. This type program is sponsored by individual producing companies for their own officials.

Closing banquets were held May 15 at Ebensburg, Pa., for central-Pennsylvania centers and May 22 at Uniontown, Pa., for southwestern Pennsylvania centers. Students and instructors attending the Ebensburg ceremonies represented the Beaverdale Harmony, Jerome, Nanty-Glo, Portage, Revloc and Windber centers. The Uniontown ceremony included students and instructors from the Carmichaels, Ellsworth, Hiller, Mapletown, Masontown, Republic, South Union and Uniontown centers. Guest speaker at both was Dr. T. S. Polansky, assistant professor of fuel technology College of Mineral Industries, Pennsylvania State University. Among other speakers were Ray Pearson, superintendent of maintenance, Cambria div., Bethlehem Mines Corp., at Ebensburg, and J. A. Younkins, assistant general superintendent, coal division, Duquesne Light Co., at Uniontown.

Courses of study offered by the extension services include 144-hr programs in elementary, intermediate and advanced coal mining, which make up the 3-yr mining curriculum, mechanized-mining electrical applications, hydraulics in mining equipment and coal preparation. A 2-yr program of 96-hr courses in mine surveying and the supervisory-training program also are offered. Correspondence instruction for out-of-state students is available.

New texts and instruction materials now are being prepared for the 1954-55 term, particularly in hydraulics and coal preparation. Efforts will be made to expand the program in order to provide an increased number of technically-trained men for the industry.

Full details of the program may be obtained from J. W. Hunt, associate professor in charge of mining extension, College of Mineral Industries, Pennsylvania State University, State College, Pa.

Bureau to Open Morgantown Station

The USBM is planning to occupy its new Morgantown, W. Va., experimental station immediately, Secretary of the Interior Douglas McKay announced June 11. The newly completed facility, which occupies a 45-acre tract just outside the city limits, will accommodate laboratory and pilot plant equipment and personnel engaged in experimental production of synthesis gas as a part of the Bureau's synthetic liquid fuels research, now housed on the West Virginia University campus and elsewhere in the city; laboratory equipment and personnel for petroleum and natural-gas research in the Appalachian region, now centered at Franklin, Pa.; and district headquarters for mining studies and health and safety work now carried on from Fairmont.

Gilberton Coal President says of

New Wilmot Heavy-Density Vessel

"BEATS ANYTHING I'VE SEEN"

New Wilmot H D S Plant Exceeds Rated Capacity on 2nd Day

Another installation of the new Wilmot Heavy Density equipment went into operation recently. This one is at the above plant of Gilberton Coal Co., an anthracite operation at Gilberton, Pa. Of this latest in a series of successful installations, Gilberton's President John B. Rich said: "This plant started off with a bang from the first minute of operation. 90% of the rated capacity was realized the first day, and better than 100% on the second day's run. This newly designed Wilmot Heavy Density separatory vessel beats anything on the market".

Features of the new Wilmot Heavy Density system are its compact complete-in-one-unit construction, custom design to fit floor space, and its unusual simplicity. In sizes for finished product capacity of 50 to 800 tons per hour.

Pictured above, preparation facilities of Gilberton Coal Co., Gilberton, Pa. The recent installation of Wilmot Heavy Density equipment is located in the primary cleaner plant on left. Wilmot Hydrotators, and Wilmot classifier and froth cell equipment are features of the anthracite preparation equipment in building on right.

Send for Data on This NEW Heavy Density Development

We shall gladly send you technical details, field performance records, as well as information concerning specific applications.

WILMOT ENGINEERING CO. HAZLETON, PA. Plant: WHITE HAVEN, PA.

Ohio Safety Men Laud Progress, Set Sights on Higher Goals

"WHAT HAS CONTRIBUTED MOST to reduction of accidents in Ohio mines and how can our record be further improved?"

That was the question to which safety leaders addressed themselves April 21 at the 24th meeting of the Mining Section, All-Ohio Safety Congress, at Columbus, Ohio.

Following are major speakers at the meeting, together with excerpts from their remarks:

Harry J. Dusz, chief, Ohio Division of Mines, Columbus—"Five agencies are directly responsible for our increase in safety: (1) mine workers who, through desire for safety, education in safety and better knowledge of protective methods, have protected themselves and worked for better understanding between themselves and management; (2) mine owners, who have learned that safety pays in less human suffering and from a financial standpoint; (3) the U. S. Bureau of Mines, through widespread education in safety; (4) miners and operators jointly, through cooperation in safety training and promotion, and in improving mining laws; and (5) the Ohio Division of Mines, through better enforcement of the laws.

"For further improvement, I suggest continuation of the fine spirit of cooperation among all agencies having to do with safety."

J. W. Greaves, safety advisor, Division of Safety & Hygiene, Industrial Commission of Ohio, Scio—"What is the value of a poster in safety promotion? Everyone connected with the problem of accident prevention realizes that to have safety, we must educate. To educate, we must communicate. Posters are a positive form of both education and communication. If we can agree that posters do have value, then we must also agree that an effort to get better posters is worth while. One way to improve posters is to get more people to participate in their development. Each man here has a different experience from that of the next fellow. Contribution of poster ideas from any individual, organization or group will be welcomed always."

Stanley Norris, safety director, Youghiogheny & Ohio Coal Co., Martins Ferry—"Records show that our accident experience into the 40's was nothing to be proud of. However, there came a realization by management that the situation had to be corrected. There followed a number of appointments of safety directors at the various mines. Shortly thereafter, the Safety Directors' Organization was formed. These men, working together and exchanging ideas, have contributed much to our better record.

"To improve our record, the efforts we have put forth in past years must be doubled. We recommend: (1) training of minors before they become miners; (2) adequate training programs for all employees in first aid, accident prevention, mine rescue and on-the-job procedures; (3) specialized training for supervisors; (4) close supervision; (5) continued research to improve mining methods; and (6) selection of some person of known qualifications to promote safety in and around the mines."

Alvin Douglas, vice president, District 6, UMWA—"Safety advancement is measurable by the amount of effort expended in its behalf. Many are deserving of credit for Ohio's record but, in my opinion, the power motivating and governing the tempo of the safety movement was generated and given birth by the adoption of the Safety Code and its inclusion in the joint agreement between UMWA and the operators.

"For further improvement, I could sum up my many suggestions by simply recommending stricter compliance with the code. To retain its place in the economy, the coal industry must produce in quantity a quality commodity adequate to meet demands. This may be our biggest challenge. The cutting of corners and the increased pace tend to relax certain work standards. We cannot allow this to happen. This is our mutual problem. We must all face it and conquer it together."

T. C. Higgins, chief, St. Clairsville Area Office, Accident Prevention & Health Div., USBM—"Greatest improvement in the accident record of Ohio

(Continued on p 151)

Kentucky Group Host to High-School Seniors

FOR THE 7TH CONSECUTIVE YEAR, senior high-school boys from Pike, Floyd, Letcher and Johnson counties, Kentucky, toured a mine property and enjoyed a packaged lunch as the guests of the Big Sandy-Elkhorn Coal Mining Institute, in cooperation with the Mayo State Vocational School and the Big Sandy-Elkhorn Coal Operators' Association. The annual event, arranged to acquaint the boys with the opportunities the industry offers, was held May 8 at the Hendrix mine of the Consolidation Coal Co. (Ky.), Deane, Ky., and was attended by 131 students and some 45 mining officials.

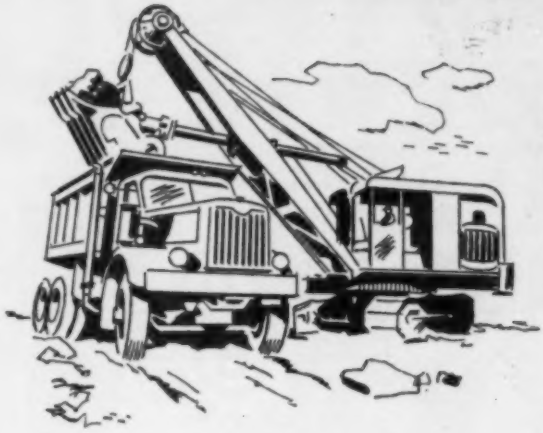
The plan to take the boys underground had to be revised by a last minute change of work schedule requiring the mine to work that day and they were shown the outside operations, including Consol's "Clean" cleaning plant *(Coal Age*, April, p 86). Before starting on the tour, each group of boys was briefed on the mine layout by R. C. Collier, Hendrix superintendent.

Among the institute members participating, shown above, were: Front row—George Mears (left), USBM, Norton, Va.; J. H. Mosgrove, secretary, Big Sandy-Elkhorn Coal Mining Institute; H. C. Brumbaugh, USBM, Norton; C. D. Halbert, safety inspector, Consol (Ky.); and Harry Sherman, superintendent, Glo Valley Coal Corp.

Second row—G. W. Davis, executive secretary, Big Sandy-Elkhorn Coal Operators' Association; W. J. McKenzie, Mayo School; G. L. Ramey, director of the Mayo School; R. C. Collier, Hendrix superintendent; James Fleming, superintendent, Wayland Div., Elk Horn Coal Corp., and institute president; Ray Roller, Jeffrey Mfg. Co.; and George E. Evans Jr., president and general manager, Glo Valley Coal Corp.

Standing—R. W. Storey, chief engineer, Consol (Ky.); O. J. Harm, Mine Safety Appliances Co.; M. E. Prunty, safety director, Consol (Ky.); M. M. McCormick, superintendent, Pond Creek Pocahontas Co.; David A. Zegeer, assistant to the president, Consol (Ky.); George E. Evans, Glo Valley Coal Corp.; and Drexel Webb, foreman, Hendrix preparation plant.

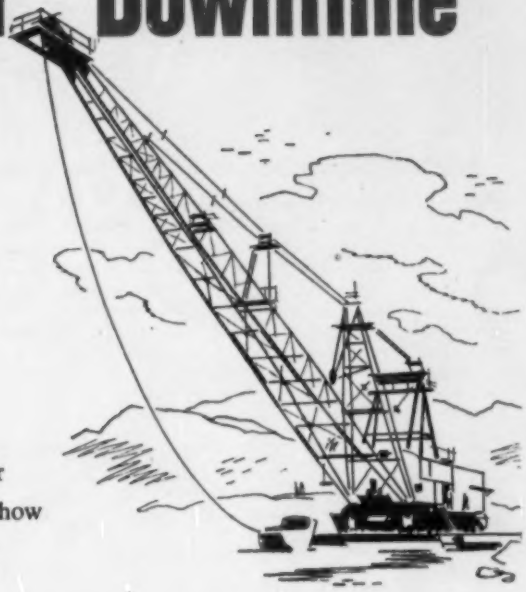
Double Proof of Sinclair Savings!



10,000 Hours without Overhaul

Sinclair TENOL® kept a Diesel-powered Shovel in top operating condition 10,000 hours without overhaul.

No Lubrication Downtime in Two Years!



Sinclair JET LUBRICANT kept a Bucyrus-Erie Drag Line lubricated 24 hours a day, 7 days a week with no lubrication downtime in 2 years.

● Wherever wheels turn or friction must be lessened, a Sinclair lubricant can improve your operations. Your Sinclair Representative will show you where and how. Write or phone him, or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, N. Y.

SINCLAIR LUBRICANTS

Among the Manufacturers

Wilson Heads Jeffrey Sales

J. E. M. Wilson, vice president and manager of the company's mining division, has been elected vice president in charge of sales for the Jeffrey Mfg. Co., Columbus, Ohio. Appointments of veteran executives to new posts announced by Mr. Wilson include: Lincoln Kilbourne, general manager of sales for the conveyor division; A. R. Anderson, general manager of sales for the mining division; and J. B. McNaughton, general manager of sales for the special products division.

Scandinavia Belting in 50th Yr

The Scandinavia Belting Co., Newark, N. J., this year celebrates its golden anniversary. Originally established as British Belting & Asbestos, Ltd., in England, an American branch was officially incorporated in May, 1904. The company operates a modern plant in Charlotte, N. C., for the manufacture of conveyor and transmission belting and auto and truck brake linings, and its headquarters are in Newark, N. J.

G-E Plans Maintenance Forums

A series of productive maintenance forums to help industry get the most productivity from its existing facilities is planned by the General Electric Co., Schenectady, N. Y. The first of the forums, conducted by the company's Apparatus Sales Div. in 26 cities in the nation, was held in Chicago and Cleveland in early June. The meetings are designed for plant operating groups, including maintenance, manufacturing and production management, and plant engineering personnel. The program for the productive maintenance forums will include a 25-min color motion picture, illustrated talks by various experts, exhibits, and literature.

Von Perbandt Joins Wilmot

Otto von Perbandt has joined Wilmot Engineering Co., Hazelton, Pa., as a contracting engineer for the company's coal preparation equipment. Mr. von Perbandt, whose experience includes consulting service for foreign governments, has been engaged in the engineering of preparation equipment for the American coal industry for over 25 yr and formerly was with the Nelson L. Davis Co. His previous associations include Allen & Garcia Co., Roberts & Schaefer Co., and Link-Belt Co.

Alemite Names Sales Head

Stewart-Warner Corp., Chicago, has appointed Thomas M. Murphy manager of industrial sales of the Alemite Div., succeeding E. Ralph Harris who has become distributor of Alemite lubrication products and Stewart-Warner instruments at St. Louis, Mo. Mr. Murphy has been a factory sales representative in the industrial sales department since 1947.

Pa. Crusher Moves Offices

Pennsylvania Crusher Co. moved its offices May 22 from Philadelphia, where it has been located for nearly 50 yr, to its own building in West Chester, Pa. The test-crush laboratory with its full line of crushers and screen analysis equipment also is being moved from Norristown, Pa., to the new quarters, thus putting the engineering department and the laboratory, as well as the general office staff, all in the same building. Expansion and development of its line,

(Continued on p 158)

Electric Controller to Build New Plant

CONTRACTS have been awarded by the Electric Controller & Mfg. Co. for new integrated plant and office buildings on a 27-acre site that when completed will house all the company's operations in Cleveland and provide additional space for further expansion when needed. Highlights of the new facilities are a greatly increased engineering and laboratory area to be fully equipped with testing equipment necessary for the company's expanding development program; and 258,000-sq ft of manufacturing space on one floor designed to provide the flexibility and versatility needed for new and changing products. The plant is scheduled for completion in the spring of 1955.

Fairbanks, Morse Dedicates Pump Plant

ONE OF THE MOST MODERN pump plants in the Nation, geared to an annual output of enough pumps to move 35 billion gallons of water per day, was formally dedicated and opened to the public by Fairbanks, Morse & Co. in a 4-day ceremony during May. The program included what is believed to be the first industry-wide forum on hydraulics and the problems arising from the increased demand for water in the United States. Located on a 38½-acre site in Kansas City, Kan., selected because of the area's central location, the works will employ some 900 persons when in full operation. Included in the facilities are a completely mechanized foundry occupying 150,000 sq ft, a manufacturing department covering 190,000 sq ft, two test laboratories and a two-floor office section with 18,000 sq ft.

York Plant to Expand Caterpillar's Service

IMPROVED PARTS SERVICE to its eastern and export customers and expansion of its manufacturing facilities have been achieved recently by Caterpillar Tractor Co., with the opening of its new plant at York, Pa. The dual-purpose facility, which has 770,000 sq ft of space under one roof and currently employs 650 people, manufactures certain replacement parts for the company's line of track-type tractors and also serves as a regional storage and shipping center for the company's entire parts line. "Caterpillar expects 1954 to be a year of opportunity for outstanding success in the machinery business for the aggressive and ingenious machinery merchandiser," L. C. Allenbrand, manager of the York plant, told the press at an Open House, "We are not alarmed," he said, "at a general leveling off of all business volume, but regard it as a challenge to our skill in building and in selling, to make our product the one the customer wants." He pointed out that Caterpillar's investment in new and improved plant facilities since World War II, including the York plant, has totalled $150 million.

COMPTON Model 36 Coal Auger

designed for { *Maximum recovery ... at Minimum cost*

The new Compton Model 36 Coal Auger is the answer to the demand for rapid, economical high wall recovery in small, narrow pits. Only 36 feet long and weighing approximately 25 T., the Model 36 includes all the design advantages of the other Compton Coal Augers.

- Convenient, accessible auger sections racked on the frame.
- Synchronized winches for handling auger sections.
- Hydraulically operated pilot pan eliminates spillage between machine and highwall.
- Elevating conveyor is integral part of machine.
- Hydraulically-controlled swiveling discharge chute permits uniform trimming of trucks.
- Hydraulic jack legs (with self-leveling pontoons for better floatation) allow drilling up to 160 feet without misalignment.
- Single or vertical overlapping holes can be drilled in varying coal seam thickness.

The Compton Model 36 Coal Auger paves the way to higher quality through selective mining! Up to 60 Tons per hour recovered in actual production tests! Plan today to expand your present or future developments with Compton Coal Augers.

(Write for details about other Compton Auger Models 42, 48 and 56.)

Model 36 SPECIFICATIONS

Length: 36 *feet* *Weight: Approx.* 25 *T.*
Carries eight 20 *ft. auger sections*
Required pit width: 38 *feet min.*
Power: 150 *hp Diesel engine*
Hydraulic Frame Jack Lift: 54 *inch*
Auger Diameters: 44 *inch to* 24 *inch*
Possible Drilling Depth: 160 *feet*

The Compton Cutting Head — non-clogging type with a built - in spider bearing assembly — increases production by drilling straighter holes with less frictional drag.

Consult a Compton Engineer for Details

Compton, Inc.

ORIGINATORS OF COMPTON LUMP RECOVERY HEADS

BOX 1946 — PHONE 4-6384 CLARKSBURG, WEST VIRGINIA

The Bluefield Coal Show

MINING AND ALLIED EQUIPMENT concerns from 32 states displayed products and services at the 1954 Southern Appalachian Industrial Exhibit, held in the Norfolk & Western freight station at Bluefield, W. Va., May 26-28, under the auspices of Pocahontas Electrical & Mechanical Institute, in cooperation with the coal, railroad, wholesale and other industrial interests.

Show officials included James B. Wooldridge Jr., director; W. L. Osborne, general chairman; and S. S. Cooper, vice chairman. J. W. Pero handled the Pioneer Miners' Reunion held in connection with the show June 28. In addition to honoring old-time miners, the reunion was marked by award of Joseph A. Holmes Certificates of Achievement to qualifying members.

Guessing contests put on by exhibitors included the number of holes in a piece of perforated metal displayed by the Hendrick Mfg. Co. Closest to the actual number of 127,252 was O. R. Hess, Cedar Grove Collieries Co., Smithers, W. Va., with an estimate of 126,880.

Equipment and services exhibited at the show included the following:

Acme Machinery Co., Williamson, W. Va.—Model HSJ Jumbolter, drill steels, Acme Model 275-E compressor, LeRoi-Cleveland rock drills.

Ahlberg Bearing Co., Chicago—Ball bearings, pillow blocks, reground bearing service.

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.—Dustrol transformers, Nema rerated motors, totally enclosed fan-cooled squirrel-cage motors, Size-6 across-line starters, Texrope drives, Vari-Pitch pulleys, Ripl-Flo, Aero-Vibe and Low-Head vibrating screens.

The American Mine Door Co., Canton, Ohio—Canton track cleaner, Mighty-Midget and Little Chief rock dusters, Canton Electri switch throwers.

American Pulley Co., Philadelphia 29

INDUSTRY MEETING — A Special COAL AGE Staff-Written Report

—Power-transmission equipment, including Wedgbelt drives, Shaft-King speed-reduction drives, adjustable-speed sheaves, steel split pulleys, conveyor pulleys, Econ-O-Matic motor bases and backstops.

American Steel & Wire Div., U. S. Steel Corp.—New Amerclad bridge-wall-construction mining machine cables, Tiger Brand wire ropes.

Anaconda Wire & Cable Co., New York—Securityflex mining cables and portable cords, trolley wire, aluminum feeder cable, high-voltage borehole and distribution cables.

Anchor Sales Co., Beckley, W. Va.—Crescent tools, Simonds abrasives, Greenfield taps and dies, Burndy electrical connectors, Crosby clips, Victaulic couplings, Ridgid pipe tools, Lufkin tapes, Armstrong and True Temper tools, Culman chain and sprockets, Rome mining cables.

Appalachian Electric Power Co.—General Electric Weathertron and Westinghouse heat pumps, room air conditioners.

Armco Drainage & Metal Products, Inc., Middletown, Ohio—Steelox buildings, Armco tunnel liners, liner-plate bins, Multiplate sections, sheeting, retaining-wall plates, corrugated pipe and culvert, Spiralweld pipe, overcasts and roof supports.

Ashland Oil & Refining Co., Ashland, Ky.—Permatreat coal spray and industrial lubricants.

Austin Powder Co., Cleveland, Ohio—Firthite mining tools, Coalmaster drilling and cutting tools.

Automotive Supply Co., Bluefield, W. Va.—Marquette welders and battery chargers, Aro greasing equipment, Aeroil steam cleaners.

Banks-Miller Supply Co.; Buchanan-Williamson Supply Co., Grundy, Va.; **Williamson Supply Co.**, Williamson, W. Va.—Alemite Oil-Mist and Accumeter centralized lubricating systems, Goodrich belts, Lunkenheimer valves, Diamond chain, Gustin-Bacon couplings, Bethlehem wire rope and roof bolts, Simplex-Tirex cables, Iron City drill steel, Ingersoll-Rand drilling equipment.

Barlow Sales & Engineering Co., St. Albans, W. Va.—Products of Electric Distributors Co. (Johnson fault-finder); Electric Controller & Mfg. Co.; Kuhlman Electric Co.; Magic Chemical Co. (belt-repair materials); Bishop Mfg. Co. (new Bi-Seal self-bonding tape, Bi-Prene neoprene insulating tape); and Vimasco Corp. (Vimasco M5-22 coating for mine roofs and stoppings, non-flammable, brush or spray application, approved by Pennsylvania Dept. of Mines; also Carlon vinylite-brand resin coatings).

Bearing Service Co., Pittsburgh—Ball and roller bearings.

Bird & Son, Inc., E. Walpole, Mass.—Bird roofing and siding.

Bixby-Zimmer Engineering Co., Galesburg, Ill.—Bee-Zee screens.

Black & Decker Co., Towson, Md.—Electric tools of all types—drills, wrenches, etc.

Blackhawk Mfg. Co., Milwaukee, Wis.—Hand and power tools.

Bluefield Hardware Co., Bluefield, W. Va.—Carlon plastic pipe, Goodyear rubber products, Union chain, Guyan resistors, Bethlehem roof bolts, Elreco line materials, Sherwin-Williams paints, Fafnir bearings, Burndy connectors, Gardner-Denver compressors, Aeroquip hydraulic hose, Leschen wire rope, Lincoln Electric welding equipment and supplies, Economy fuses.

Bluefield Supply Co.; Counts Automotive Supply Co., Bluefield, W. Va.—du Pont paints, Skil portable tools, Johns-Manville building materials, Raybestos linings, Willard batteries, Smith's welding and cutting equipment, Homestead valves, Bethlehem wire rope, Toledo pipe tools, Klein electric tools, Victaulic pipe couplings and fittings, Rome mining cables, Drake electric soldering irons, Vermette power tools, Powder Power Tool Corp, tools, Reed Mfg. pipe tools, Plomb Proto tools, Ridge tools, Noble & Stanton products.

Boston Woven Hose & Rubber Co., Boston 3—BWH conveyor belting, hose and electrical tape.

Browning Dust Collector Co., Hampden, W. Va.—Browning dust collectors.

Burndy Engineering Co., Norwalk, Conn.—Service and grounding connectors, industrial connectors, mine terminals, including new compression splices and terminals for mine service.

J. B. Burress, Roanoke, Va.—Mayhew rotary drill for highwall drilling, Air-Trac self-propelled drill for underground and highwall work.

Calcium Chloride Institute, Washington, D. C.—Calcium chloride for dust-proofing, freezeproofing, shuttle-car roads, etc.

COAL MEN ON THE JOB . . .

FREEMAN COAL CORP., Marion, Ill.—Ronald Wilson (left), general superintendent, southern division; Lowell Smith, chief electrician, Freeman No. 4 mine; and Tom Wimberly, chief electrician, Freeman Nos. 3 and 4 mines.

Ray C. Call Co., S. Charleston, W. Va.—General Motors 110-hp 100-kw and Type 671 90-kw diesel generating sets.

Carboloy Dept., General Electric Co.—Carboloy cemented-carbide mining tools, featuring 12 new styles of coal bits; Alnico permanent magnets.

Cardox Corp., Chicago—Airdox equipment.

Caterpillar Tractor Co., Peoria, Ill.—Caterpillar DW12 tractor with Athey PR21 wagon, Caterpillar D318 75-kw DC electric set, Caterpillar D326 100-kw DC electric set, Caterpillar No. 6 2-yd shovel, Caterpillar D8 150-draw-bar-hp tractor with dozer.

Centrifugal & Mechanical Industries, Inc., St. Louis—CMI dryers.

Charleston Electrical & Supply Co., Charleston, W. Va.—Falk motor reducers and couplings, Allis-Chalmers motors, Prox cutter bars, chains and bits; Allis-Chalmers Texrope drives, Fedders room air conditioners, Pure carbon brushes, Cesco field and armature oils, Sealtite flexible conduit, Anaconda wires and cables, Diamond chain, Oasis water coolers, Deming pumps, Goodyear mechanical rubber goods, Ohio Brass line materials.

Chicago Pneumatic Tool Co., New York—RBD 30 roof drill, 903R universal electric impact wrench, 365RP and 36-30-RP pneumatic impact wrenches, 572 electric hand-held coal drill, DP-20 pneumatic sump pump, CP-32 pneumatic sinker drill.

Compton, Inc., Clarksburg, W. Va.—Compton coal augers.

Coppinger Machinery Service Co., Bluefield, W. Va.—Electro Dynamic electric motors, mining machinery parts and supplies, maintenance tools, Woods power-transmission equipment.

Davey Compressor Co., Kent, Ohio—Davey rotary drill for core, highwall and well drilling, 6¼-in hole, Hercules diesel drive, mounted on GMC 454 truck.

Joseph Dixon Crucible Co., Jersey City, N. J.—Dixon paints, trolley-wire lubricant, ball and roller-bearing grease, graphite.

Dodge Div., Chrysler Corp.—Job-Rated trucks and Power Wagons.

E. I. du Pont de Nemours & Co., Inc.—du Pont paints and coatings.

Duquesne Mine Supply Co., Pittsburgh—Redipt mine-car hitchings, bolts and track accessories, line materials, fused trolley nips, section switches, roof bolts.

The Elreco Corp., Cincinnati, Ohio—Line materials, featuring double-inverted trolley system.

Ensign Electric & Mfg. Co., Huntington, W. Va.—Dusttight distribution box, safety belt control, centrifugal switches, 25-hp reversing starters for belt conveyors, Henry phase converter for operating 3-phase motors on single-phase power, hinge-type line connectors, explosion-tested push buttons, permissible distribution box, explosion tested AC starter, 10-hp DC explosion-tested starter, Bulletin 2101 explosion-tested cable reel.

Enterprise Wheel & Car Corp., Bristol, Va.—Aluminum mine car.

Erico Products, Inc., Cleveland—Cadweld powdered-metal rail bonding and cable-splicing equipment, electrical connectors.

Utility's Mine Wins Company-Wide Safety Award

WITH NO LOST-TIME ACCIDENTS during the period, the Harwick mine and the Cheswick & Hamar R.R. of the Duquesne Light Co. was the sole winner of the President's Gold Safety Award for the first quarter of 1954 among the various competing divisions of the company. Shown above during presentation ceremonies at the mine are: Pressly H. McCance (right), Duquesne Light president; M. E. Fowler (left), Harwick safety engineer; J. E. Elkin, superintendent, Coal Dept.; J. H. Truax, Harwick superintendent; and Walter Zwies, UMWA safety committeeman.

Esso Standard Oil Co., Charleston, W. Va.—Esso lubricants and fuels.

Femco, Inc., Pittsburgh—Femco trolleyphones and audio communication for tipples, loud-speaking telephones for outside and underground, permissible shot firer, Portafone high-frequency (citizens band) unit for repair crews, pump control and indication, remote circuit-breaker control, remote fan indication.

Flexible Steel Lacing Co., Chicago—Flexco and Alligator conveyor-belt fasteners and tools.

Ford Motor Co.—Trucks and cars.

Frontier Bronze Corp., Niagara Falls, N. Y.—Aluminum shaker conveyor, aluminum couplings, Frontier aluminum pipe wrenches.

Gardner-Denver Co., Pittsburgh—Air compressors, centrifugal pumps, air motors, air hoists, air tools, air-line oilers, air sump pumps.

The Gates Rubber Co., Denver, Colo.—Gates Vulco Rope V-belts, Gates industrial hose, Flex-Flo plastic pipe, Gates sheaves.

General Cable Corp., New York—Electrical wires and cables, including Type MI Safety insulated cable.

General Electric Co., Assemblies and Component Sales Div.—Safety switches and residential circuit breakers; Lamp Div.—mine lamps and other illumination products.

Goodman Mfg. Co., Chicago 9—Hydraulic equipment, including locomotive brakes, motors and controls for mining equipment, Holmes DryDuctor roof-bolting drills, cutter chains, conveyor rollers.

B. F. Goodrich Co., Akron, Ohio—Carricol conveyor belts, hose, Koroseal brattice sheet and trolley guard, new Koroseal rigid pipe.

Goodyear Tire & Rubber Co.—Conveyor belt and the Goodyear two-way belt conveyor.

Gorman-Rupp Co., Mansfield, Ohio—Gorman-Rupp pumps including O-series self-priming centrifugal pumps.

Grinnell Co., Inc., Providence, R. I.—Grinnell pipe fittings, pipe hangers, unit heaters, Grinnell-Saunders diaphragm valves, welded pipe fittings.

Gulf Oil Corp.—Gulf mining machinery lubricants.

Gustin-Bacon Mfg. Co., Kansas City—Gruvagrip pipe couplings featuring new Gruvajoint coupling, Rolagrip couplings for plain-end pipe.

Guyan Machinery Co., Logan, W. Va.—Reda submersible pumps, Guyan resistors, bond welders, headlights, headlight switches, automatic motor starter.

Harris Pump & Supply Co., Charleston, W. Va.—Peerless vertical turbine pumps, Peerless turbine vane pumps for spray service, Peerless general service water pumps, Marlow gathering pumps, Weatherhead hose fittings, Moyno spray and gathering pumps.

Hazard Insulated Wire Works, Div. The Okonite Co., Wilkes-Barre, Pa.—Wires and cables including twin Type W shuttle-car cable with red Hazaprene separator between power conductors, 3-conductor parallel cable for AC rubber tired equipment, all sizes of 2-conductor parallel cable with round ground wire for use with ground relay.

Hendrick Mfg. Co., Carbondale, Pa.—Perforated plate, Mitco open floor grating, Wedge Slot screens.

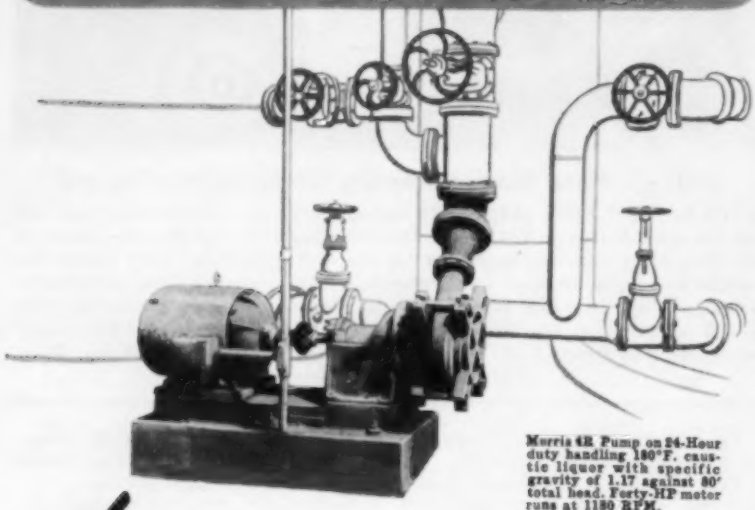
Hewitt-Robins, Inc., Passaic, N. J.—Electrically heated Gyrex screen, conveyor idlers, screen cloth, hose, belting.

Harvey Hubbell, Inc., Bridgeport, Conn.—Electrical connectors, featuring Hubbellock and Twist-Lock receptacles, connectors and caps.

Huntington Supply & Equipment Co., Huntington, W. Va.—Faralun brake shoes, Cincinnati cutter bars, chains and

For Continuous 24-Hour Pumping

of solid or chemical mixtures



Morris 4R Pump on 24-Hour duty handling 180°F. caustic liquor with specific gravity of 1.17 against 80' total head. Forty-HP motor runs at 1180 RPM.

Morris Type R Slurry Pumps

Ordinary harsh abrasives wear out your pump. Corrosive action of acids eats away its utility. Time-consuming maintenance and repairs cut down your production. Here's why the Morris Type R helps avoid these problems . . .

1.—Simple design. No internal studs and bolts—no troublesome internal joints and fits.

2.—Easily dismantled. Impeller and shaft sleeve reached by simply removing 4 *external* bolts.

3.—Abrasive resistant. Casing furnished in large variety of wear-resistant materials, including glass or porcelain.

4.—Large hydraulic passages. Permit low velocities to minimize wear and frequency of renewals.

5.—Drive-side suction. Stuffing box troubles practically eliminated under conditions of high suction pressure, high vaccum and high suction lift.

Let our engineers help you select the right pump for your job. Or write for Bulletin No. 181.

MORRIS MACHINE WORKS

Baldwinsville, N. Y.

Sales Offices in Principal Cities

MORRIS *Centrifugal Pumps*

EQUIPMENT APPROVALS

Seven approvals of permissible equipment were issued by the U. S. Bureau of Mines in May, as follows:

Joy Mfg. Co.—Type Super 14BU-8BF loading machine; one 4-hp and four 15-hp motors, 500 v, DC; Approval 2-938A; May 6.

Jeffrey Mfg. Co.—Type Aerodyne Junior blower electric-drive unit; 7½-hp motor, 550 v, DC; Approval 2-951A; May 10.

Goodman Mfg. Co.—Type 56 Timberman; 10-hp motor, 250 v, DC; Approval 2-995; May 3.

Jeffrey Mfg. Co.—Type 61, Class 11 blower electric-drive unit; 1½-hp motor, 200 and 440 v, AC; Approvals 2-996 and 2-996A; May 6.

Joy Mfg. Co.—Type X15067-1 drive unit for Type 12B drill; 10-hp motor, 250 v, DC; Approval 2-997; May 11.

National Mine Service Co.—Types 7AU-10R and 7AU-11R mining machines; one 26-hp and one 50-hp motors, 250 v, DC; Approval 2-998; May 19.

National Mine Service Co.—Types 6SC-2BPE and 6SC-2BPXE cable-reel shuttle cars; three 7½-hp motors, 250 v, DC; Approval 2-999; May 25.

Bluefield Coal Show . . .

bits, Tool Steel gears and pinions, Nolan Porta-Feeders.

Ideal Industries, Inc., Sycamore, Ill.—Wiring tools, motor tester, motor maintenance tools.

ITE Circuit Breaker Co., Philadelphia—DC sectionalizing breakers for underground mining service.

Jacuzzi Bros., Inc., St. Louis, Mo.—Water systems.

The Jeffrey Mfg. Co., Columbus—Type 66B4 shuttle car, 4-wheel drive, 4-wheel steer, 4-ton capacity, 36 in high; permissible coal drill, conveyor chains, bug-duster, belt stands, belt impact idlers.

Johns-Manville Sales Corp.—Building materials, including Transite sheathing and roofing.

Jones & Laughlin Steel Corp., Pittsburgh—Jalten and Jalloy mining steels.

Joy Mfg. Co., Pittsburgh—Sulmet bits, SAL-37 and ASE-91 stopers, RBD-15 roof-bolting drill, electrical connectors, cable vulcanizer, cable fault finder, Safety Circuit Centers including new Quik-Loc attachable type connectors, new Magloc permissible splice boxes.

Kanawha Mfg. Co., Charleston, W. Va.—Design, fabrication and erecting of coal-preparation and coal-handling facilities.

Kennametal, Inc., Bedford, Pa.—Kennametal bits.

Kersey Mfg. Co., Bluefield, W. Va.—New HD-8 Tug, new UT-4 utility truck; new 444D 4-wheel-drive, 4-wheel-brake, 4-wheel-steer rubber-tired mine tractor; 4-wheel rubber-tired mine cars including

Specific Answer To Your Dragline Replacement Problem

Tuffy Scraper Rope Flexible enough to withstand sharp bends . . . stiff enough to resist looping and kinking when slack . . . tough enough to fight off drum crushing!

Tuffy Dozer Rope

Mount a 150 ft. reel of ½" or 9/16" on your dozer, cut off only the sections most subject to wear, save good rope otherwise wasted.

Tuffy Slings

9-part, machine braided wire fabric construction so flexible that kinking or knotting does no material damage, extra strong . . . easy to hitch on and off.

Tuffy Slusher Rope

An uniquely layed three strand, 19 wire rope—rigid against drum crushing, highly abrasion resistant yet flexible.

Just dragging wire rope around on the ground will wear it out in time—some kinds much faster than others even if made from the same steel.

Tuffy Dragline is constructed with large outer-wires to present a much greater wearing surface to longer withstand the severe abrasive action when dragging on and through all kinds of earth formations.

The inner structure of Tuffy Dragline is composed of smaller wires stranded and layed in such a way as to maintain the flexibility of the rope needed in casting the bucket and the strength and stamina to pull the bucket into the toughest kind of terrain and come up with a full load.

Because it is made specifically for dragline service, Tuffy Dragline will stay on the job longer, cut down frequency of replacement and downtime on a scale that is bound to help you in holding down production costs.

Tuffy Dragline is easy to order from your distributor—no complicated specifications nor involved inventories to contend with. Just a few words, "Tuffy Dragline—diameter—length" writes the strongest specification on draglines possible.

union Wire Rope **corporation**

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Specialists In High Carbon Wire, Wire Rope and Braided Wire Fabric

Armco Liner Plates Make Short Work of TALL BINS

You'll save installation time and money when you build storage facilities of Armco Liner Plates. These corrugated metal plates are easily handled—and readily assembled into sturdy, permanent bins. Workmen need no special training to do the job. Ordinary hand tools are used.

Individual plates are bolted together where they overlap to form 18-inch wide rings. The rings are connected along flanged edges. Plates are not too heavy for one or two men to carry, hold and bolt in place.

Armco Liner Plates are available in a wide range of sizes and gages to meet specific needs. The finished bin is fire-resistant and free from danger of cracking or breaking. And should your needs for storage change, you can dismantle the structure and reerect it on a new site without loss of materials.

Write us for complete data on Armco Liner Plates and their other money-saving uses in shafts, mine entries and overcasts. Armco Drainage & Metal Products, Inc., 4064 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. Export: The Armco International Corporation.

ARMCO LINER PLATES ARMCO

Bluefield Coal Show . . .

the rubber-tired rail car, all battery powered.

Koppers Co., Inc., Wood Preserving Div.—Pressure-treated mine materials.

Lecco Machinery & Engineering Co., Bluefield, W. Va.—Lecco double-deck sizing and dewatering screen, Lecco vibrating conveyor.

LeRoi Co., Cleveland Rock Drill Div., Cleveland—LeRoi Tractair equipped with Cleveland mobile drill for general outside rock drilling; rock drills, hydraulic coal drill, form-pin driver.

Link-Belt Co., Chicago 1—Power-transmission equipment, including PIV gear; conveyors and conveyor rolls, screens, Multi-Louvre drier, coal-preparation and handling equipment.

The Long Co., Oakhill, W. Va.—New Model 88 Pigloader, PT 15 Piggyback and 400WT conveyor forming a high capacity unit; new low-height PT12B Piggyback and new 400DB conveyor, 2 tpm, only 22½ in high; and 8BU converted for Piggyback loading with height reduced from 41 in to 31½ in.

Marathon Bit Co., Montgomery, W. Va.—Marathon bits, Carboloy mining tools, mining-machine repair parts, Timken bits, roof-bolting drill steel, McLaughlin auger bits, Iron City drill steel.

Marion Handle Mills, Inc., Marion, Va.—Hickory roof pins, tool handles.

Marshall Equipment Co., Huntington, W. Va.—Selectro vibrating screen, new Clust-R-Clone liquid cyclone classifier thickener, Mining Machine Parts, Inc., MMP Joy replacement parts, Pennsylvania Electric coils, Sterling steel castings, Gundlach crushers, John Flocker brattice cloth.

May Office Service, Beckley, W. Va.—Business machines and office supplies.

McLanahan & Stone Corp., Hollidaysburg, Pa.—Pit, mine and quarry equipment featuring new Black Diamond double-roll crusher for coal and similar materials.

McNally-Pittsburg Mfg. Corp., Pittsburg, Kans.—Dryclone sold to Ten-X Coal Co.; other McNally preparation equipment and services.

Mine Safety Appliances Co., Pittsburgh—R4 Edison cap lamps, MSA Mine Phone, Bantam rock-dust distributor, new MSA methane alarm, new Junior Wolf lamp, MSA Hoist Phone, Mask Phone, Chemox apparatus, McCaa breathing apparatus, Pneolator, self-rescuer.

Minnesota Mining & Mfg. Co., St. Paul—Scotch brand tapes, Scotchlok wire and cable connectors.

Moseback Electric & Supply Co., Pittsburgh—Power bonds, signal switches, cable protectors, brake adjuster, line materials, resistors, welding machine, choke coils, section switches, motor brasses.

National Electric Coil Co., Columbus—Coils and hot banding.

National Mine Service Co., Beckley, W. Va.—Joy rebuilt controller, Permiseal plugs, Joy repair parts, Koehler flame safety lamps, Wheat electric cap lamps, Riken gas indicators, NMS rebuilding service.

Norfolk & Western Ry.—Experimental

Where Safety Problems become Safety Products...

M·S·A
RESEARCH LABORATORY

Today's advanced mining methods place a double responsibility on safety: (1) Products must be developed to combat the new hazards of modern mining techniques; (2) Existing products must be improved to keep pace with mechanization's current demands.

Dedicated to this double goal is the M.S.A. Research Laboratory. M.S.A. products, with the extra safety added by this research, are answering mine management's need for continued and improved safety to further expand and improve mine production.

When you have a *safety problem,* chances are we can solve it for you! We'll be glad to talk it over with you.

MSA
SAFETY EQUIPMENT HEADQUARTERS

When you have a safety problem, M.S.A. is at your service. Our job is to help you.

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Cable Address: "MINSAF" Pittsburgh

CONVERTED GOODMAN 460 or 360 LOADER
CONVERTED GOODMAN 324 CUTTER
CONVERTED JEFFREY 29U CUTTER
for Economy . . .
CONVERT NOW from TRACK to TRACKLESS
"TRACKLESS MINING" with conventional cutters, loaders and shuttle cars provides the most economical and efficient mining system available today.
These trackless advantages are yours by having your track-mounted cutters and loaders converted to trackless operation - Lee-Norse "conversions" that result in greater savings to you through . . .
• Lower investment compared with new mining machines.
• Very little increase in spare parts inventory.
• Converted machines are well-known to your operators and maintenance men - no need for re-education.
• Lost time for conversions minimized.
• Obsolescence losses due to possible new continuous miner developments are held to a minimum.
Lee-Norse Company
Specialists in Coal Mining Equipment
CHARLEROI, PA.
Write today for complete facts on converting your track mounted equipment.

Bluefield Coal Show . . .

coal-burning steam-urbine-electric locomotive built by Baldwin-Lima-Hamilton Corp.

The Ohio Carbon Co., Cleveland—Carbon brushes for all types of mining equipment.

Olin Industries, Inc., Explosives Div., E. Alton, Ill.—Armstrong coal breaker featuring rubber-tired semi-portable unit and new air release with mechanical mechanism.

Pattin Mfg. Co., Marietta, Ohio—Pattin roof bolts.

Pennsylvania Tire Co., Mansfield, Ohio—Truck, passenger and tractor tires.

Persinger Supply Co., Williamson, W. Va.—Hartzell mine fans, Dodge power-transmission equipment, Chicago Pneumatic roof-bolting drill and nut runner, Simplicity gyrating screens, Bethlehem roof bolts.

Persingers, Inc., Charleston, W. Va.—Chicago Pneumatic roof drill with self-propelling attachment and MSA dust collector, Persinger-fabricated belt conveyors, Clarkson Redbird replacement chains for Joy and Goodman loaders and miners.

Platnick Bros., Bluefield, W. Va.—Structural steel and erection, scrap iron and metals.

Pocahontas Welding Supply Co., Bluefield, W. Va.—Linde air products including new Oxweld manifold; Hobart welders and supplies, Stoody hard-facing alloys and bearing castings, Ford Steel Co. manganese-nickel steel products, Wagner welding supplies.

Post-Glover Electric Co., Cincinnati—P-G resistors, transfer switches, electric heaters, reel contactors, resistance welders.

B. Preiser Co., Inc., Charleston, W. Va.—Laboratory supplies and furniture, industrial chemicals for mining purposes.

Pure Oil Co., Bluefield, W. Va.—Petroleum products for the mining industry.

Quaker Rubber Co., Philadelphia—Industrial rubber products, conveyor belting, plastic pipe.

Raleigh Junk Co., Charleston and Beckley, W. Va.—Buyers of mine scrap.

Reardon Co., Bayonne, N. J.—Bondex cement paint, Dramex coatings.

Reid Belt & Rubber Co., Bluefield, W. Va.—Belt repair and maintenance, including rebuilding, widening, etc.

Reliance Electric & Engineering Co., Cleveland—Reliance motors including new Nema-rated motors of the protected and totally enclosed fan-cooled types; Reliance V-S Jr. variable-speed drives.

Remaco, Inc., New York, N. Y.—Self-vulcanizing rubber repair material.

Republic Steel Co., Cleveland—New Republic mine roof bolt, Republic plastic pipe in flexible polyethylene and semi-rigid butyrate.

Riggs Engineering Co., Ludlow, Ky.—Trabon automatic lubricating systems for underground, tipple and cleaning plant lubrication; "Snap-Tite Hi-Flow" hose couplings.

Rish Equipment Co., Bluefield, W. Va.—International Types TD6, TD9, TD24 tractors, TD9 with Drott skid shovel, McCarthy 36-in coal-recovery drill featuring complete hydraulic operation and con-

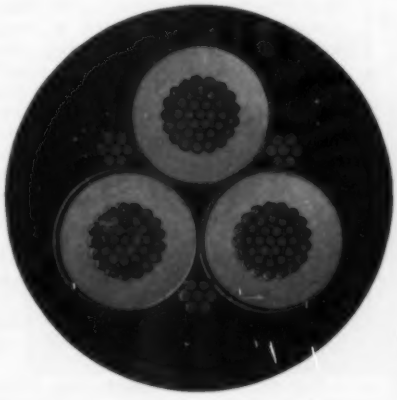
Expose it to sun and heat...

Pull it over rocks and shale...

Trench it in presence of acid water...

Through it all—

Anaconda's tough **MINE POWER CABLE** keeps power flowing



This easy-to-splice cable is built for heavy duty. It saves you money. It handles well. And it lasts longer — with fewer power interruptions, less maintenance trouble.

Here's why:

BUTYL INSULATION has high dielectric strength . . . superior long-aging characteristics . . . and excellent resistance to moisture, ozone, and heat.

NEOPRENE JACKET is tough . . . has real flexibility and great strength . . . and is resistant to flame and corrosive mine water.

See your nearest Anaconda Sales Office or Distributor for full information about this durable, low-cost Mine Power Cable. Do it today! *Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.*

54040

the right cable for the job

ANACONDA® **WIRE AND CABLE**

For just the right size—call on Hendrick

Hendrick Perforated Plate used on vibrating and shaking screens can often mean the difference between profit and loss in coal preparation. With Hendrick Perforated Metal Plate, screens enjoy longer service life and openings remain uniform even under constant, heavy-duty usage. And you can rest assured materials will be accurately sized!

When Hendrick Perforated Plate is specified delays due to blinding can be reduced to a minimum—decks can be changed in less time—and downtime can be practically eliminated.

For the flat, corrugated or stepped shape and size of perforation you specifically need to cut costs best, write Hendrick direct.

SEE OUR CATALOG IN SWEET'S

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MANUFACTURING COMPANY
41 DUNDAFF STREET, CARBONDALE, PA.
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PERFORATED METAL • PERFORATED METAL SCREENS • WEDGE-SLOT SCREENS
ARCHITECTURAL GRILLES • MITCO OPEN STEEL FLOORING • SHUR-SITE TREADS • ARMORGRIDS

The Swing is to **Durakool** Factory Set Timer Relays

FACTORY SET, TAMPER-PROOF TIMING

Practically non-breakable, Durakool **Factory Set Timer Relays** have more than proved themselves on the roughest and toughest jobs that could be found. Year by year, their use increases in sensational fashion.

Controlled time available from .15 to 20.0 seconds in either normally open or normally closed actions. No waiting. Your production schedule is met.

See telephone directory for local distributor or write for Bulletin 880

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- ★ No chatter
- ★ Quiet in operation
- ★ Low in cost

DURAKOOL, INC., Elkhart, Indiana
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Durakool ALL-STEEL MERCURY *Timers*

Bluefield Coal Show . . .

trol, Hough model HMC and HF Payloaders, Construction Machinery Model 3½ concrete mixer, Gorman-Rupp pumps, Master Vibrator concrete finishers, concrete vibrators; Ingersoll-Rand 125-cfm air compressor complete with paving breakers and Jackhamers, Barber-Greene portable and stationary conveyors, Disston chain saws, International Fremont portable generators, Blaw-Knox construction equipment, Pacific Car & Foundry towing winch, Fisk tires.

Roberts & Schaefer Co.—Coal preparation plants and equipment.

Rockbestos Products Corp., New Haven 4, Conn.—AVC mine cable, control cable.

John A. Roebling's Sons Co.—Wire rope and electrical cables.

Rome Cable Corp., Rome, N. Y.—Mining machine cables and cords, including RoZone Roprene power cables, polyethylene insulation and synthetic sheath.

Rust-Oleum Corp., Evanston, Ill.—Rust-preventive paints and coatings.

Joseph T. Ryerson & Sons, Inc., Cincinnati—Steel for coal mining.

Sanford-Day Iron Works, Inc., and Brown Fayro Div., Knoxville, Tenn.—Sealed drop-bottom car with hinged deflector plates, spring-mounted closing device, Brownie hoists, Brown-Fayro oil-spray unit.

Schroeder Brothers, Pittsburgh—Tricycle hydraulic power unit for operating Schroeder 12B hydraulic coal drill, portable hydraulic tester for on-job testing of hydraulic circuits, HA1 headlights and HRA1 resistors, hydraulic power unit for Joy T-2 truck, Model MS explosion-tested belt and face-conveyor pull-cord switches, BH carbide bit especially designed for hydraulic drill.

Skil Corp.—Portable tools, saws, drills, shears, drivers, sanders, grinders, hammers.

Smith Welding Equipment Corp.—Welding and cutting equipment.

Socony-Vacuum Oil Co.—Gargoyle lubricants.

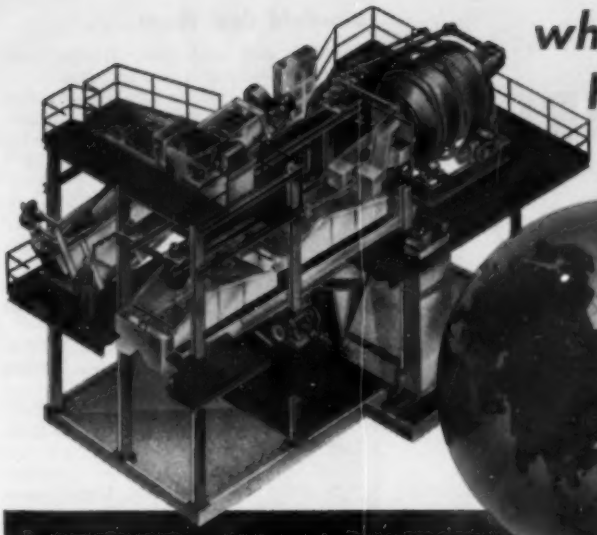
Southern Oxygen, Inc., Washington, D. C.—Victor oxyacetylene outfits, Miller portable welding machine, A. O. Smith welding machines and electrodes, nitrogen, carbon-dioxide, therapy oxygen, commercial oxygen, breathing air, Cyclo-Core drill bits, Jackson electrode holders and ground clamps, Tiveco electrode holders and ground clamps, PET electric tools, C-O-Two fire extinguishers, Alloy Rod electrodes, Manganal products, Emerson resuscitator, Cut-A-Line oxyacetylene cutting machine.

W. R. Stamler Co., Paris, Ky.—Hydraulic car spotter, hydraulic automatic control stations.

Steel Products Engineering Co., Combustion Stoker Division—Stokers and humidifiers.

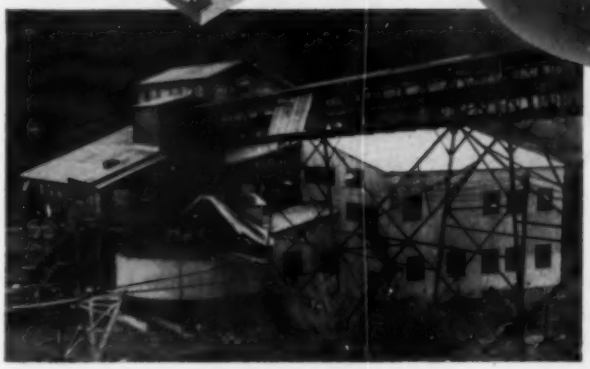
Superior Carbon Products, Inc., Cleveland 5—Carbon brushes, reconditioned contacts for mine service.

Superior-Sterling Co., Bluefield, W. Va.—American brake shoes, Anaconda wire and cable. Diamond chain, Goodrich mechanical rubber goods, Jeffrey conveyor and elevator equipment, Timken



when you consider
HEAVY MEDIA SEPARATION
remember:

OVER 50% of all HMS PLANTS are WEMCO MOBIL-MILLS



CUSTOM BUILT PLANTS

Wemco's extensive engineering and equipment experience is your assurance of our ability to design and install complete custom built preparation plants.

RENT OR PURCHASE WEMCO MOBIL-MILLS

Take advantage of Wemco's rental, rental/option to purchase, or outright purchase plans.

Write today for Bulletin M-3-M-4 and for further information on the use of Mobil-Mills in coal cleaning operations.

OTHER WEMCO PRODUCTS

Mobil-Mills • Coal Spirals • HMS Thickeners • HMS Pumps • Sand Pumps • Agitators Cone Separators • Drum Separators • Hydroseparators • Fagergren Laboratory Units Fagergren & Steffensen Flotation Machines • S-H Classifiers • Attrition Machines HMS Laboratory Units • Dewatering Spirals • Thickeners • Conditioners • Densifiers

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Approximately 185 Heavy Media plants have been placed in operation or are under construction throughout the world. Of these, 100 are Wemco Mobil-Mills located in 18 states and 15 foreign countries, and having an aggregate rated capacity of **50 million** tons annually. Here is remarkable proof of Wemco's design know-how and extensive experience in the Heavy Media Separation field.

Anthracite and bituminous coal rank first in tonnage among materials now being economically produced by Mobil-Mills. Wemco Mobil-Mills provide accurate control over coal washing with the necessary flexibility for efficient cleaning of a wide range of sizes and grades. More and more coal operators are using Mobil-Mill cleaning to assure a high yield of clean coal—the kind that always finds a steady demand. You, too, will find it profitable to learn more about the Wemco Mobil-Mill.

Check these important MOBIL-MILL features

- **Prefabricated, ready to install.**
- **Fast installation at the plant site.**
- **Minimum initial and operating costs.**
- **Clean, sharp separation with high yield.**

Mobil-Mills are furnished in five basic sizes and several models with smaller or larger plants varying in capacity from 25 to 420 TPH. Each plant is equipped with a choice of one of the following type separators:

1. **WEMCO SINGLE DRUM** for accurately controlled washing of a full range of sizes from 8" to ¼".
2. **WEMCO TWO COMPARTMENT DRUM** for efficient cleaning of coal having middling content requiring two-gravity, three product separation.
3. **WEMCO CONE SEPARATOR** for economical, large volume production of fine coal up to 4" in size.

MORE BARNEY CAR-SPOTTERS

will be sold this year

than in the last ten years!

INVESTIGATE THE COST REDUCING ABILITY OF THE

STAMLER HYDRAULIC

PIONEER & ACKNOWLEDGED BEST BECAUSE OF ITS

- PROVEN RELIABILITY
- PROVEN LOWEST MAINTENANCE
- PROVEN RESULTS OF INCREASING TONNAGE AND REDUCING COSTS.

LET US PROVE THIS TO YOU!

The W. R. STAMLER CO.

PARIS, KENTUCKY

Schroeder Bros., Exclusive Sales Agent, Pittsburgh, Pa.

SPECIFY

FLEXIPIPE® the quality ventilating tubing

Flexipipe is now available with Rope Seam Suspension *at no additional cost.* The newest, best, quickest suspension . . . eliminates special accessories and suspension wires . . . *all you need is a nail.* It equalizes strain on the tubing.

Flexipipe is efficient, serviceable, economical. Jute and heavy-duty grades available in a variety of lengths and diameters to meet your requirements.

Write for complete information and sample.

Bemis Bro. Bag Co.

408-O Pine St.,
St. Louis 2, Mo.

Bluefield Coal Show . . .

bearings and rock bits, Westinghouse electrical equipment and supplies.

Syntron Co., Homer City, Pa.—Syntron selenium-rectifier power-conversion unit, Syntron grizzly feeder, Syntron feeder; balance conveyor available up to 174 ft long, one drive, 300-tph.

Templeton, Kenly & Co., Chicago—Mechanical and hydraulic mining and maintenance jacks, pullers, roof and timber jacks.

The Texas Co., Norfolk, Va.—Texaco lubricants and hydraulic oil for mining machinery.

Timken Roller Bearing Co., Canton, Ohio—Timken bearings, carbide-insert and Multiuse rock bits.

Toledo Pipe Threading Co., Mansfield, Ohio—Pipe-threading machine and tools, featuring the new rock-drill power machine, 6-in through 48-in pipe wrenches.

Bertrand P. Tracy Co., Montgomery, W. Va.—Mining machinery replacement parts for Tracy cutter chains.

The Union Wire Rope Co., Sandusky, Ohio—Union drive and conveyor chains, sprockets, new Galanot tire-track for rubber-mounted vehicles.

Union Wire Rope Corp., Ashland, Ky.—Tuffy wire rope and slings.

United States Rubber Co.—Hose, plastic pipe and fittings, V-belts, tape, packings, conveyor belts, featuring the new Super Ustex-Nylon belt, portable cords and cables, and mine power cable, featuring U. S. Royal Gold portable mining cables with lead-cured yellow-neoprene jacket.

Van Cleef Bros., Inc., Chicago—Dutch Brand friction tape.

Victaulic Co. of America, Elizabeth, N. J.—Victaulic pipe couplings and fittings, featuring the new Roust-A-Bout coupling, 3-in plastic-pipe insert, and complete line of rubber-lined fittings for use with plastic pipe.

Virginian Electric, Inc., Charleston, W. Va.—Products of General Electric, including Tri-55-Clad motors, Roebling, Joy, Rome Cable, Holophane Co., Aurora Pump, Miller Co., General Cable, Crouse-Hinds, Johnston Pump Co., and Leyman Mfg. Corp. (McGowan pumps).

West Virginia Armature Co., Bluefield, W. Va.—Dolph's insulation paint; armature, stator and field coils, Quinterra insulation, headlights for underground equipment, journal brasses, Victor Oil seals.

W. Va. Belt Sales & Service, Inc., Mt. Hope, W. Va.—Mitco industrial tires.

West Virginia Steel Corp., Charleston, W. Va.—Warehouse, fabricated and structural-steel products.

West Virginia Steel & Mfg. Co., Huntington, W. Va.—West Virginia roof bolts featuring the new finger-type expansion nut; West Virginia mine ties.

West Virginia Tractor & Equipment Co., Charleston, W. Va.—Murphy diesel generator set, 20-ton Dart truck, 2-hp Cedar Rapids motorized head pulley, Marco tubular frame conveyor, H. & L. dipper teeth, LeTourneau-Westinghouse equipment, Wisconsin air-cooled engines, Gardner-Denver air tools, Northwest cranes, shovels and draglines.

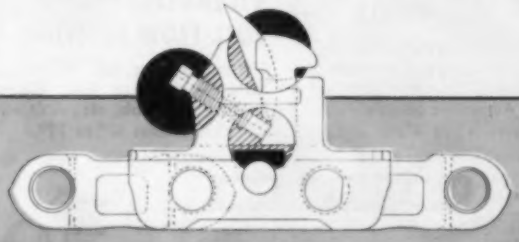
Get extra-long-life —extra hard-cutting time!

PROX

SINCE 1875

COAL CUTTING EQUIPMENT

- DUOMATIC CUTTER CHAINS
- TOOL STEEL BITS
- CUTTER BARS



New Prox Coal Cutting Equipment has already proved itself to be the answer to higher production at lower per-ton costs. The Prox Duomatic Cutter Chain is designed to assure long-lasting dependability. The exclusive, circular-back drop forged tool steel bit is one of the strongest available. And the new Prox Cutter Bars are, by far, America's sturdiest.

FRANK PROX COMPANY, INC. • TERRE HAUTE, INDIANA

Consult your nearest PROX SALES REPRESENTATIVE for complete information:

P. L. JOHNSON 519 East Main St. Hazard, Ky.	ROBT. A. THOMPSON Hotel Madison Madisonville, Ky.	T. E. FOSTER P. O. Box 683 Uniontown, Pa.	CHARLESTON ELECTRICAL SUPPLY CO. Charleston, West Virginia	CAMBRIDGE MACHINE & SUPPLY CO. Cambridge, Ohio	MINE SUPPLY CO. 402 So. Main St. Carlsbad, N. M.	FRANK HEMMOTT Box 154, Castle Gate, Utah	CHARLES J. FORBES, Sales Mgr. Frank Prox Co., Inc. Terre Haute, Ind.

VICTAULIC
METHOD OF PIPING

FOR GROOVED PIPE

Style 77 & 77-D

Style 78
VICTAULIC SNAP-JOINT

New, boltless coupling — hand-locks — for faster hook-ups with no loose parts. Ideal for temporary or permanent lines. Sizes 1", 1¼", 2", 3", 4".

VICTAULIC COUPLINGS Style 75

Style 77 & 77-D—The "general-purpose" couplings for standard applications. Simple, fast, reliable—sizes ¾" to 60".

Style 75—Light Weight Couplings—for low pressure, low external stress applications. Sizes 2", 3", 4".

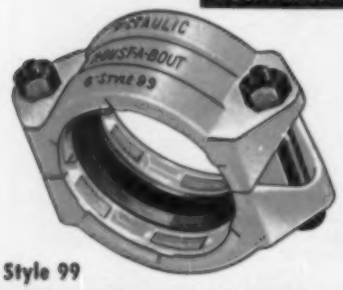
VIC-GROOVER TOOLS

Handy, on-the-job grooving tools that do the work in half the time. Light weight, easy to handle, operate manually or from any power drive. Automatic groove position and depth. Sizes ¾" to 8".

VICTAULIC FULL-FLOW FITTINGS

Streamlined for top efficiency, easy to install—complete line, Elbows, Tees, Reducers, Laterals, etc., — fit all Victaulic Couplings. Sizes ¾" to 12".

FOR PLAIN END PIPE



Style 99
VICTAULIC ROUST-A-BOUT COUPLINGS Best engineered, most useful plain end joint on the market! Simple, fast, husky. Easy to install with any socket wrench. Takes strong, positive, bull-dog grip on pipe. Sizes 2" to 8".

Promptly available from distributor stocks coast-to-coast. Write for NEW Victaulic Catalog and Engineering Manual No. 54-8C.

VICTAULIC COMPANY OF AMERICA
P. O. Box 509 • Elizabeth, N. J.

EASIEST WAY TO MAKE ENDS MEET!

Bluefield Coal Show . . .

Westinghouse Electric Corp., Pittsburgh—Life-Line motors, Life-Linestarters, incandescent and fluorescent lamps.

Andy Williams, Inc., Bluefield, W. Va. —Ford trucks and cars.

Yardley Plastics Co., Columbus 15, Ohio—Clear Stream non-corrosive pipe and fittings, PressuRated plastic pipe.

Other service and safety exhibitors included:

Mercer County Vocational School.
United States Bureau of Mines.
West Virginia Department of Mines.
West Virginia Heart Association.
West Virginia School of Mines and Extension Service.

New Books for Coal Men

How Coal Behaves in Boilers

Frontiers in Heat Extraction From the Combustion Gases of Coal, by E. J. Kaiser. Guides to maximum efficiency and satisfaction from coal in power boilers are provided in this study of heat-release rates, heat-absorption rates and the effect of boiler design on ash behavior. *10 pp. 8½x11-in; paper. 25c per copy. Bituminous Coal Research, Inc., 2609 First National Bank Building, Pittsburgh 22, Pa.*

How Bulk Solids Flow

Flow of Solids in Bulk Handling Systems and Flow of Bulk Solids in Bins, by A. W. Jenike. Part I is a report on a quantitative method of design for flow of bulk solids in bins, hoppers and spouts. Part II deals with the pressures arising within a bulk solid confined in a bin. *Bulletin 64, Utah Engineering Experiment Station. 38 plus 43 pp. 8½x10 ¾-in; paper. No price quoted. University of Utah, Salt Lake City.*

Helps for Engineers

Lefax Pocket Data Books. New catalog lists over 2,000 subjects in engineering covered by Lefax Pocket Data Books. Each book contains about 140 pages of reference material. The books cover the following, among other general subjects: hydraulics, machine design, piping data, surveying tables, transformers, relays, electricity AC-DC, motors and generators, mathematics, chemistry, physics, mechanical drawing and trig-log tables. *$1.25 per book; six for $5. Lefax, Philadelphia 7, Pa.*

Other Books and Booklets

Injury Experience in Coal Mining, 1949—Detailed Analysis of Factors Influencing Mine Safety and Related Employment, Production and Productivity Data, by S. T. Reese, V. E. Wrenn and E. J. Reid. USBM Bulletin 525. 131 pp. 8x10½-in; paper. 60c, Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Coal-Mine Bumps: Some Aspects of Occurrence, Cause and Control, by C. T. Holland and Edward Thomas. USBM Bulletin 535. 37 pp. 8x10½-in; paper. 35c, Superintendent of Documents, Government Printing Office, Washington 25, D. C.

NYLON in the U. S. Royal Con-Trak-Tor helps you through the heavy going—*keeps you on schedule!*

ALL-NYLON STRENGTH

The Con-Trak-Tor's Nylon cord body withstands murderous impact . . . means that you get every hour of tire life built into this great U. S. Royal tire.

TRIPLE IMPACT PROTECTION

The Con-Trak-Tor's built with extra rubber between cord-plies—double shock-pads beneath the tread—tough rock-resisting construction at the crown.

FULL LUG TRACTION

The Con-Trak-Tor's full-width lug design digs deeper, pulls harder in forward or reverse—actually works where other tires stall.

Prove it. Put the Nylon U. S. Royal Con-Trak-Tor to work—watch your pay loads stay on the move. Your U. S. Royal Dealer has it in your size, for your job.

NYLON...Keeps Pay Loads Moving!

U.S. ROYAL

CON-TRAK-TOR
FULL LUG

US RUBBER UNITED STATES RUBBER COMPANY

COAL MEN ON THE JOB . . .

Traux-Traer Coal Co.
Central Plant, Ceredo, W. Va.

LEFT PHOTO—C. N. Howard (seated, left), plant engineer; H. N. Hicks, superintendent; Jack M. Bishop (standing, left) chemist; I. Basso, office manager; and J. L. Dress, Traux-Traer preparation manager.

RIGHT PHOTO—Clarence E. Effingham (left), outside foreman, second shift; John S. Heatherly, plant foreman, second shift; Ben H. Rees, plant foreman, day shift; and George Frazer, assistant superintendent

CAPACITY COUNTS

These two views at the Princess Elkorn No. 1 Mine, David, Kentucky, show clearly the low height operating conditions within the mine. Differential's 24" (high) cars are really loaded — and crown-scraped — as they approach the rotary dumper (also Differential).

DIFFERENTIALS HAVE IT

The lower the entry the more clearly are Differential Mine Cars called for. The special patented "AXLESS" trucks carry payloads where other cars carry dead weight. It's a fact that within given length, width and height, you get **more cubic footage than in any other make!** This means fewer cars required!

It all adds up to (1) lower investment, (2) less maintenance, (3) lower operating costs. **Differentials have it** on all counts!

Send for Bulletin D-53 for details

Other Differential Products: Locomotives, Mine Supply Cars, Rock Larries, Mantrip Cars, Rotary Dumpers and other dumping devices, and Complete Haulage Systems.

DIFFERENTIAL STEEL CAR COMPANY
FINDLAY, OHIO

SINCE 1915—PIONEERS IN HAULAGE EQUIPMENT

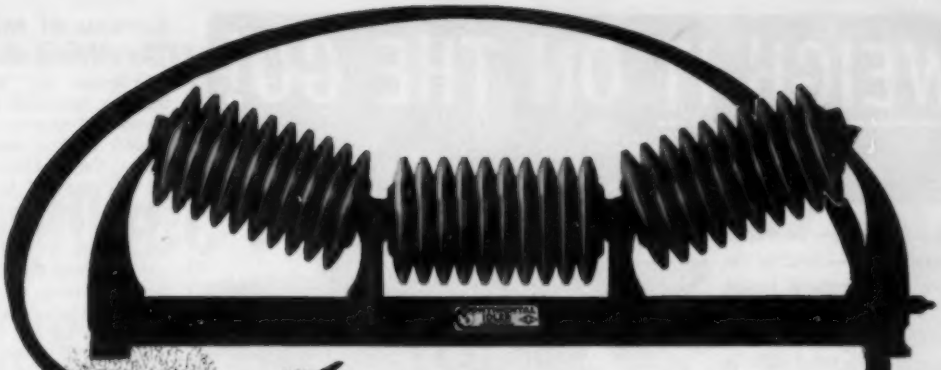
"W" DENTED SHAKER SCREENS

A "must" when it comes to obtaining an efficient job! *Good* because the spreading and collecting riffles give uniform spread of material over the entire screen surface . . turns the top and middle flow of material down in direct contact with the screen . . . gives an increased screening efficiency up to 33% on fine sizes over an undented flat screen.

Comes in Carbon and Stainless Steels and Manganese Bronze. No sag.

Write us today. We shall reply promptly.

REMALY MANUFACTURING CO., INC.
TAMAQUA, PA.



Continental IMPACT IDLERS — the BIG Difference...

In Conveyor Belt Life

Insist on Continental Impact Idlers under the loading point of your conveyors:

1. **Absorbs greater impact**
2. **Increases belt life**
3. **Lower belt maintenance**

Here's a typical installation that is really paying off—a Continental Shuttle Conveyor handling 600 TPH at 350 FPM. Systems such as this are constantly proving the value and reliability of Continental Conveyor Equipment.

Specify CONTINENTAL CONVEYORS

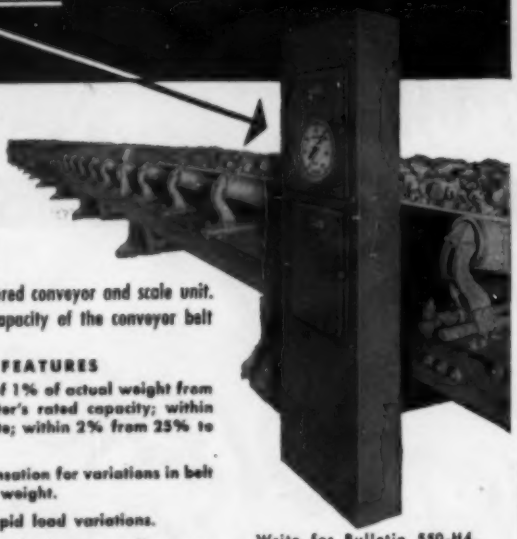
Write for your copy of Engineering Data Book ID-481-A "Continental Belt Conveyors"

CG-5201

INDUSTRIAL DIVISION
CONTINENTAL GIN COMPANY
BIRMINGHAM, ALABAMA

ENGINEERS CGC ATLANTA • DALLAS • MEMPHIS • NEW YORK CGC MANUFACTURERS

WEIGH IT ON THE GO!



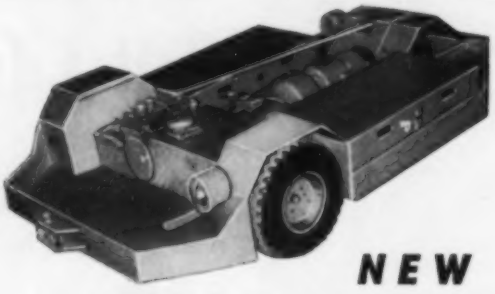
Builders Conveyoflo—the modern conveyor meter — totalizes the weight of dry material passing over conveyor belts. Continuous, automatic, extremely accurate — Conveyoflo is installed right in your present conveyor, or can be furnished as a separate, self-powered conveyor and scale unit. Capacity is limited only by the capacity of the conveyor belt itself.

EXCLUSIVE FEATURES

- Accurate . . . within ± ½ of 1% of actual weight from maximum to 50% of meter's rated capacity; within 1% from 50% to 25% rate; within 2% from 25% to 10% of rated capacity.
- Automatic totalizer compensation for variations in belt speed and changes in belt weight.
- Responds accurately to rapid load variations.
- Paces auxiliary equipment (feeders, controllers, continuous blending processes, etc.) and operates secondary instruments.

Write for Bulletin 550-H4. Builders-Providence, Inc. (Division of B-I-F Industries, Inc.), 391 Harris Avenue, Providence 1, Rhode Island.

BUILDERS-PROVIDENCE
DIVISION OF B-I-F INDUSTRIES, INC.
METERS FEEDERS CONTROLS



NEW

MODEL HD-8,
TWO WHEEL DRIVE, TUG TRACTOR
FOR LOW COAL

- Direct drive—(No chains).
- Hydraulic disc brakes.
- Can be operated with ease in 24" coal.
- 18" in height, except at rear wheels. Maximum heigh 22".
- Two speeds—Forward and reverse.
- Continuous duty motor and large capacity battery, for heavy duty service.

Battery Chargers For All Types of Mining Equipment to Operate From AC or DC Power Source

KERSEY MANUFACTURING CO.
P. O. BOX 150
BLUEFIELD, VIRGINIA PHONE 4228

Bureau of Mines Awards "Sentinels of Safety"

Winners of "Sentinels of Safety" trophies, awarded each year to the six mines and quarries with the best safety records in their respective groups of the annual National Safety Competition of the U. S. Bureau of Mines, were announced June 21 by Secretary of the Interior Douglas McKay. The 583 mines and quarries in 41 States that competed in 1953 attained the best safety record since the competition was inaugurated in 1925. Trophy winner in the two coal-mining groups were:

Anthracite mines (underground): Coal Brook colliery, The Hudson Coal Co., Carbondale, Pa., which worked 209,088 man-hours with four lost-time injuries totaling a loss of 44 days.

Bituminous coal mines (underground): Hanna No. 4-A mine, The Union Pacific Coal Co., Hanna, Wyo., which worked 374,702 man-hours without a lost-time injury.

Besides a bronze trophy, each winner will receive a "Sentinels of Safety" flag, both donated by the *Explosives Engineer* magazine, which they will retain for a year. Each employee of a winning mine receives a Certificate of Accomplishment in Safety. The bureau also will award Certificates of Achievement in Safety to 154 competing mines and quarries—the four runners-up in each group, plus all other injury-free contestants working at least 30,000 man-hours.

Underground anthracite and bituminous coal mines entering the competition attained new low severity and frequency rates last year, and bituminous mines had the fewest accidents per million man-hours of any group of underground mines in last year's competition, the bureau reported. Any mine or quarry in the country is eligible to enter the safety competition. Contest rules and application forms can be obtained from the Accident Analysis Branch, Health and Safety Div., USBM, Washington 25, D. C.

NEWS BRIEFS . . . From p 114

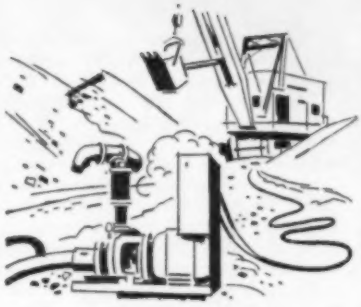
commission are Henry Ward, Commissioner of Conservation, and A. D. Sisk, chief of the Department of Mines & Minerals. Mr. Chinn, former director of the state Div. of Flood Control and Water Usage, is an engineering graduate of the University of Kentucky and has been associated with several government agencies, the U. S. Army Engineers and in private practice. Under the new law, effective July 1, a permit for strip mining must be obtained from the commission and a reclamation program must be carried out for the land stripped.

NCA Issues 1953 Coal Annual

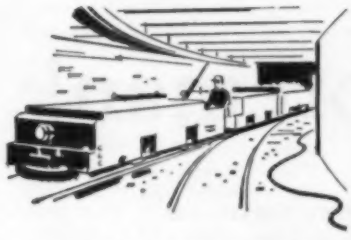
The National Coal Association, in a foreword to its Bituminous Coal Annual for 1953, declares that the bituminous industry "has all the physical elements" for a successful industrial enterprise, but "is being hurt by things over many of which coal company managements have

Here's a new answer to corrosive mine water...

Republic Flexible Plastic Pipe



STRIP MINING



UNDERGROUND MINING

LOW-COAL MINING

Because mine water is highly corrosive, drainage pipelines must frequently be replaced—at considerable expense.

This is just one of the mine drainage problems solved by Republic FI Flexible Plastic Pipe. Made of polyethylene, FI is impervious to the effects of acidic and alkaline waters, exhaust gases and other wastes and it resists electrolytic corrosion. Result: big savings in maintenance costs.

Its flexibility makes it particularly useful in coal mines. In strip operations, Republic FI follows the contours of the terrain, is easily dragged over sharp rock formations with little danger of damage.

Its extreme lightness makes FI easy to handle in underground mining. Available in long lengths, it can snake around corners, is quickly installed without rigging equipment. In low-coal mining one man can handle and install several hundred feet of FI with no cumbersome joining to worry about.

Make-up is fast and easy. A complete line of insert-type fittings makes possible any type of piping arrangement, whether plastic to plastic, or plastic to steel. Only tools required are ordinary handsaw or knife and screwdriver for tightening stainless steel clamps. Simple joining steps help cut installation time by 75%.

Republic Flexible Plastic Pipe comes in 9 sizes from ½" to 6". In coils it's available in sizes ½" through 3" in diameter. Straight lengths are furnished in 4" and 6". For complete data on sizes, fittings and applications, write to:

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SEMI-RIGID AND FLEXIBLE

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Salutes You...

Mr. Section Foreman!

"In coal, perhaps more than in any other industry, the success of an enterprise is dependent upon the section foreman."

That statement, from the annual report of one of America's largest coal companies, reflects the feeling of American Oil Company. As supplier of specialized lubricants for mine equipment, we have been pleased to cooperate with you, Mr. Section Foreman, in making our engineering consultation service available to you and your management in many important coal companies.

We are sympathetic with your problems, Mr. Section Foreman, and we are at your service anytime . . . anywhere . . . in AMOCOal territory.

AMOCO LUBRICANTS

FOR MINE MACHINERY

AMERICAN OIL COMPANY ● FROM MAINE TO FLORIDA

no control." Bituminous coal reserves are sufficient for centuries, the industry is capably managed, has adequate modern transportation and is up-to-date technologically. But "the industry faces serious problems" and the manner of their solution "can affect the national economy, our nation's defense and how well you live," the foreword added. The 164-p volume of facts and figures now being distributed to the press and others is the sixth in a series started in 1948 and is one of the many services of NCA's public relations department. It presents the latest available statistics on production and consumption of bituminous coal through 1952, and other information.

Bituminous Group to Seek Help From The White House

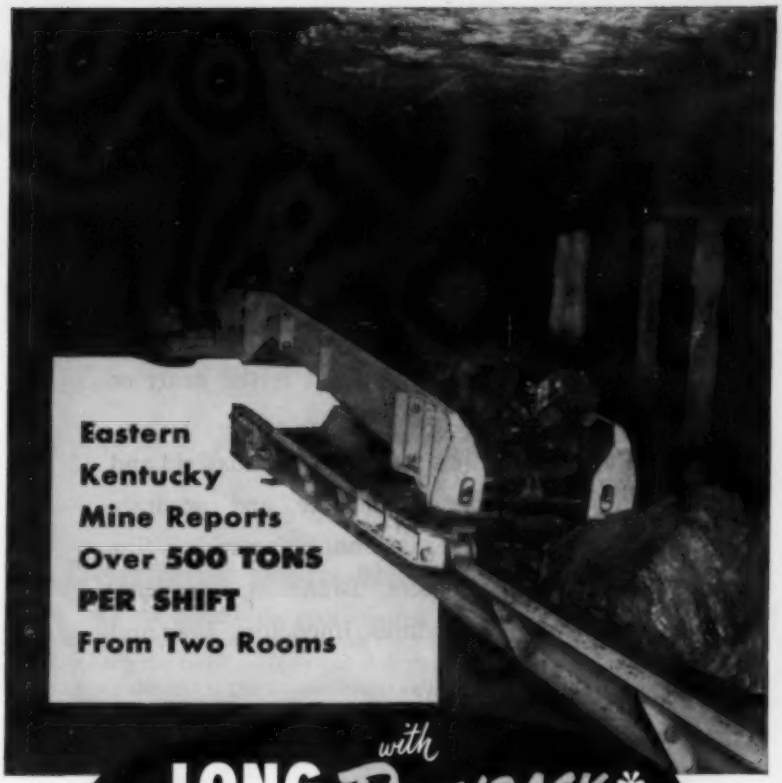
A delegation of bituminous coal operators from the Southern Appalachian region under the guidance of Sen. John S. Cooper (R., Ky.) were scheduled to call at The White House in mid-June to suggest adoption of a government policy on coal. Included among the points to be suggested were: (1) a ban, or at least a restriction, on imports of residual oil to eastern seaboard industry from what is called inefficient refineries of the Caribbean area; (2) easing of restrictions designed to hold down the prices of oil and natural gas, which if permitted to reach their normal price levels would not be so competitive with coal; (3) government aid and stimulation of exports to Europe and elsewhere; (4) burning of more coal in government installations; (5) exclusion of foreign natural gas; and (6) promotion of the use of coal.

Pa. Mines Compete in Regional Safety Meets

The program of sectional first-aid meets to determine contestants in the Pennsylvania state-wide bituminous meet to be held Sept. 11 was launched last month with the 13th annual contest of the Allegheny-Kiski Safety & First Aid Association held June 12, at New Kensington, Pa. On June 19, the Moshannon-North Central Safety Association held its 8th annual meet at Clearfield, Pa.

Winning team in the Allegheny-Kiski meet was that of the Harwick mine of the Duquesne Light Co., with a score of 99.20. Runners-up were: Renton Team No. 1, Renton Coal Co., 98.86; Springdale mine, Allegheny Pittsburgh Coal Co., 98.53; and Renton Coal Team No. 2, 98.00. In addition to cash prizes for the first three teams of $420, $350 and $280, the winners received the MSA plaque and NCA belt buckles and the second team the UMWA plaque.

Placing first in the Moshannon-North Central competition with a score of 99.867 was the Kramer mine of the Northwestern Mining & Exchange Co., which received $210, the MSA plaque and the 12th District banner. The Colmol operations of the Freebrook Corp. placed second with a score of 99.533 and was awarded $175 and the 2nd District banner. Third with a score of 98.934 was the Ringgold cleaning plant of the Freebrook Corp., recipient of a $105 prize.



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CONTINUOUS HAULAGE MINING

Utilizing two Piggyback Conveyors in 5 to 6 foot of coal, with mobile cutting, an eleven-man crew has consistently produced more than 500 tons per production shift out of only two rooms. This mine had been previously reported in a national magazine to show an average of 44 tons per man for an eleven-man crew for a sustained period.

You have known that conveyor mining is low maintenance mining. It is also well known that Piggyback mining has meant high tons per man from small crews in thin seams. Here is proof that Piggyback mining can also give high as possible total tonnage out of a concentrated area. Capital investment per ton for installing Piggyback mining in high coal, as well as low coal, is much lower than any other modern mining possibility.

*Trade Mark

For complete details or a demonstration, write us today!

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Formerly Long Super Mine Car Co.

THE HEART
of your preparation plant

Successful coal cleaning oftentimes depends upon the proper type of crushing of raw coal, middlings, and refuse. Your crushing equipment is not an auxiliary but is the heart of your preparation plant.

Pennsylvania has specialized in this field and has developed a dependable and accurate method of crusher selection, along with a line of Bradford Breakers, Bradmills, Hammermills, Ring Hammermills, Impactors, Jaws and Single Rolls.

Our engineers welcome the opportunity of working with you on any coal cleaning or sizing problems you have.

Ask us to send you our new catalog of crushers for the coal mining industry, Bulletin No. 4010. Pennsylvania Crusher Company (division of Bath Iron Works, Inc.)
Room 1711, West Chester, Pa.

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Bradmills
Reversible Hammermills
Non Reversible Hammermills
Ring Hammermills
Dixie Hammermills
Dixie Non Clog Hammermills
Single Rolls
Reversible Impactors
Kue-Ken Jaws
Kue-Ken Gyracones

And For Your Information . . .

Purchase of a late-model German coal planer is being negotiated in Germany by Herbert E. Jones Jr., executive vice president of the Amherst Coal Co., for use in the company's Logan County, West Virginia, mines. Mr. Jones, accompanied by his brother, Charles T. Jones, executive vice president of the Amherst Fuel Co., flew to Germany June 3 to complete arrangements for the machine.

John L. Lewis, through the UMWA, late in May became the second "largest" banker in Washington, D. C., according to press reports. Mr. Lewis, or interests allied with him and the UMWA, were understood to have acquired majority control of the Hamilton National Bank, which now is headed by Barnum L. Colton, who also is president of the National Bank of Washington reportedly acquired by Mr. Lewis 5 yr ago. Mr. Lewis refused comment on his participation in the deal.

The U. S. Army, its face somewhat red, has finally decided that its new armory in Wilkes-Barre, Pa., had better not burn oil, it was reported from Washington June 21. Specification of an oil burner by Army engineers in advertising for construction bids in May brought immediate and vocal objections from congressmen in the district, the Anthracite Information Bureau and others.

A 35c per ton reduction on eastern fine coal moving to lake destinations in the U.S. and Canada has been approved by the Interstate Commerce Commission, effective June 3. A similar reduction on fine coal to the same area from the Middle West became effective May 26.

A concentrated promotion campaign has been launched by the Automatic Solids Fuels Equipment, Inc., for sale of the Campbell automatic coal stoker before the start of the heating season this fall. Since the first of the year, 451 of the newly introduced units have been sold. The early operational defects have been remedied and a highly improved burner now is being produced.

The Town of Corbin, Ky., will be the site of a new $7,800,000 coal-cleaning plant to be built by the U. S. Steel Co. under the ODM's accelerated tax program, according to reports. The city is the center of the L&N's coal-hauling operations from the upper Cumberland River Valley.

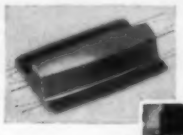
The Evans Coal Co., at 1:45 pm, June 17, shipped its millionth ton of cleaned strip-mined coal for use in steel mills. The shipment from the company's Evans mine, Bokoshe, Okla., was consigned to the Sheffield Steel Co., Houston, Tex. Company officials believe that the property is the only strip mine in the country to have produced that much cleaned metallurgical coal.

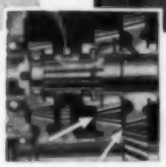
An ore mining division has been formed by the Lehigh Valley Coal Corp. to develop uranium and thorium properties and adapt these new energy sources to industrial uses, as a part of the new management's decision to not only modernize its coal production methods but enter other fields of energy production.

Why more and more truck manufacturers are shifting to FULLER

Demand from the field

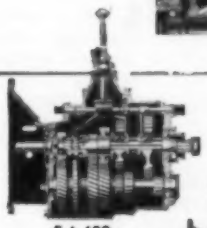
Ask the driver—the man who has to maintain engine rpm to meet round-trip schedules. Ask the mechanic—the man who has to keep the truck *on the road*. Ask the owner—the man who has to pay the bill if the transmissions fail. They'll tell you they want a Fuller Transmission . . . *for Fuller has the features for more profitable trucking.*





Fuller design features

Open up a Fuller Transmission . . . and you can see the "extras" Fuller provides. Take a Fuller-equipped truck out on the road and *feel* it perform. Constant mesh, helical gears mean easier, faster shifting in forward speeds. Crowning the gear teeth prevents stress . . . longer life for Fullers. Shot peening reduces metal fatigue . . . less material failure.



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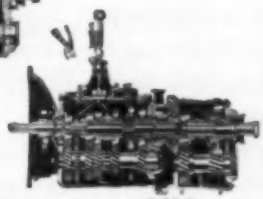
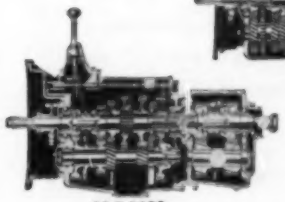


R-95-C ROADRANGER



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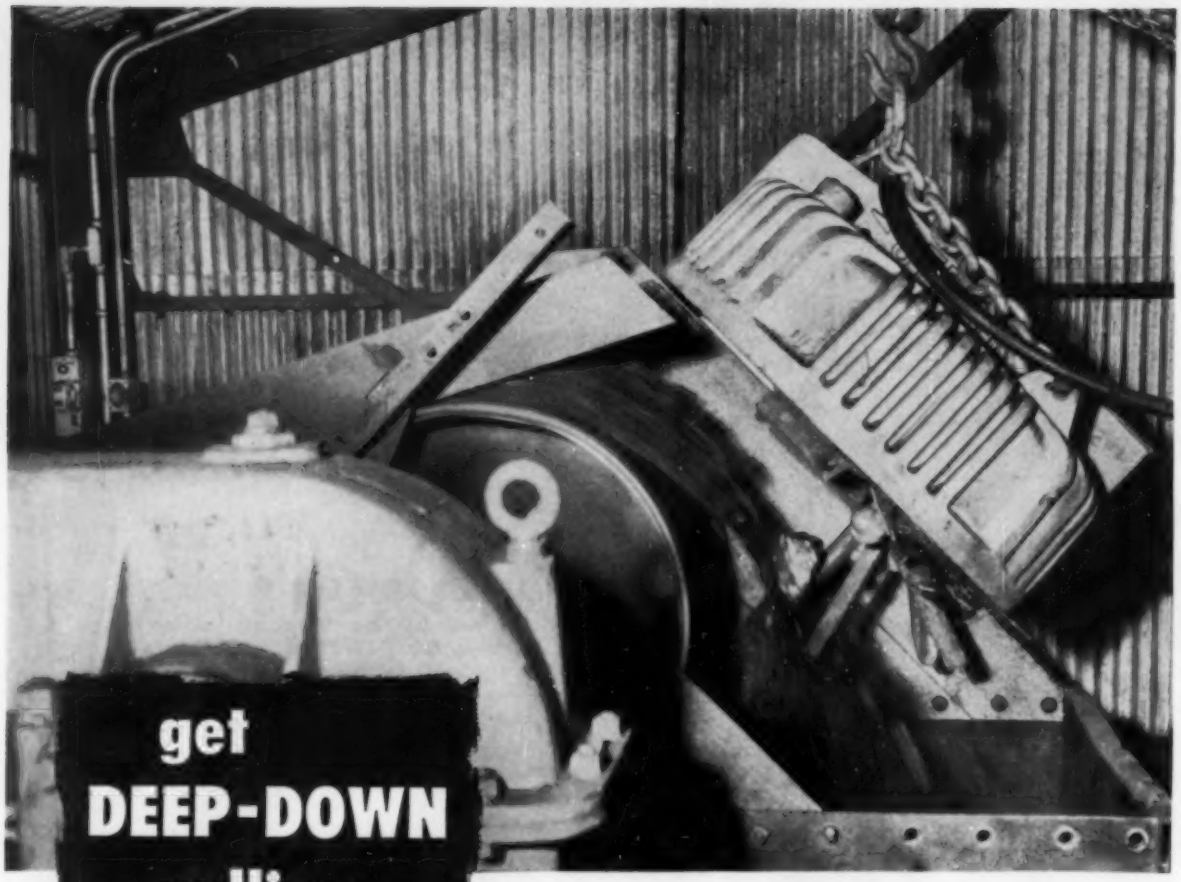

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- ✓ Coil-wound for continuous duty. Special insulation and rib-type head casting assure fast heat dissipation.
- ✓ Leads and terminals fully protected against abrasion.
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- ✓ Vacuum-impregnated windings assure long life and dependable operation.

A Stearns circular-type, suspended separation magnet provides a tremendous pulling force that reaches far down into material on conveyor lines — prevents the escape of deeply embedded tramp iron — protects crushers and other processing equipment from costly damage.

Stearns suspended separation magnets are available in sizes ranging from 16 to 65 inches in diameter. A postcard request places nearly 40 years of research and engineering experience at your disposal. Write today.

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MAGNETIC EQUIPMENT FOR ALL INDUSTRY

STEARNS MAGNETS

STEARNS MAGNETIC, INC. 661 S. 28th St., Milwaukee 46, Wisconsin

Ohio Safety . . . From p 124

coal mines, as well as in other states, appears to have occurred during the 11 yr in which a division of the USBM has been acting as a coal-mine inspection agency. The work of the USBM inspection forces has resulted in many major improvements in Ohio, including systematic roof support, the ban on black powder, new fans and additional openings, pre-shift and on-shift examinations for gas, rock-dusting, rules against smoking underground, and use of permissible electric cap lamps.

"Even so, it is my sincere belief that the one thing that has contributed most to safety improvement is the cooperative action of labor, management, state and federal inspection services and other agencies.

"For further improvement, I would suggest that greater emphasis be placed on accident-prevention training."

A. C. Kasper, mine safety committeeman, Glen Castle mine, Hanna Coal Co., Dillonvale—"The most important contribution to accident reduction in eastern Ohio is the fact that both management and labor really wanted to reduce accidents and really worked together as a team to tackle this big job. Gradually, over the past 8 yr, there seemed to come a change in the relationship between our safety committee and the management of our mine. It is hard for me to put my finger on what caused this change. Perhaps we, the safety committee, began to sense that management really did want to do a good job of safety, and perhaps management began to indicate to us that they really wanted our help. Or perhaps we, the safety committee, began to understand a little better the problems of getting good safety records, keeping the mine safe and getting the men to accept safe work habits.

"Today, we may have our honest differences on other matters but there is no room for disagreement on fundamental safety matters. I do not mean to say that we will never disagree on what may constitute a safe practice or a safe condition, but I do say that if management and men are sincere in wanting to do a good job, our differences can be ironed out easily. Our experience has been that many times when we received more information on a particularly safety matter, we have changed our position; and often management, after talking with us about a problem, has changed its position.

"As for further improving the safety record, the desire for safety by management and the safety committee must continue. There can be no letting down by management in keeping its mine and equipment in safe condition. There can be no letting down in training everyone at the mine in safe work habits and good mining practices."

James D. Reilly, vice president, Hanna Coal Co., St. Clairsville—"I believe that any factual analysis of our accident improvement in Ohio will reveal that where improvement has been made, cooperation has existed to a relatively high degree among all parties who have an interest

Hydroseparation and thickening — proven metallurgical processing steps — are being put to work in the coal preparation plant of Pennsylvania Water & Power Co. at Safe Harbor, Penn. Feed to the washing plant is anthracite bearing silt dredged from the Susquehanna River, and the finished product is used as fuel for a nearby power plant operated by the same company.

Here's how Dorr equipment fits into the flowsheet:

FIRST — Raw coal bearing silt from the river bed is pumped to a 65′ dia. Dorr Type BW Hydroseparator. Feed rate is 7400 gpm at 10% solids which the BW deslimes at 200 mesh. Underflow, containing 30-35% solids, goes on to further treatment while the overflow goes on to step two, below.

SECOND—Hydroseparator and flotation thickener overflows are combined and fed to a 150′ dia. Dorr Type SS Thickener at a rate of 8500-9500 GPM. Thickener underflow is impounded, and overflow — 7000 GPM — is returned to the process for re-use.

We'd like to tell you more about how Dorr Metallurgical methods are now being used in coal preparation plants. Write for a copy of Bulletin No. 7100 to The Dorr Company, Stamford, Conn. No obligation, of course.

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Ideal for tough loads, high lifts and long center distances. Steel-like in strength, yet highly flexible for easy troughing. Twice as strong as similar gauge cotton belts. Resists deterioration by water, oil, weather. These are only a few of the advantages of the Quaker Mainliner . . . made of multiple ply strong duck, with nylon woven across the width and high strength cotton woven lengthwise. For low cost, top-tonnage conveying, use the Mainliner . . . another Quaker quality product for long wear and top performance.

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in safety, including the UMWA, coal-mine management and federal and state bureaus. We have found that all the training in the world went to waste unless there was a spirit of cooperation. We found it was next to impossible to keep our mines in continuing good condition, to stand up well under inspections by state and federal men, without this spirit of cooperation.

"Another factor in our safety improvements is contributions by engineers and manufacturers in providing improved equipment such as automatic couplers, better illumination and safer-designed locomotives, for example. Another contribution has been safety posters and bulletins provided by the Department of Safety & Hygiene. The work of the Safety Directors' Organization and the operators' safety committee also has spotlighted our safety shortcomings and helped overcome them.

"In comparing safety statistics we should be very realistic, looking beyond statistics into the facts behind them. We should not be misled by comparing Ohio's 1953 accident rate with the 1930 rate, assuming therefore that we have made as substantial improvement in our underground mines as those figures might indicate. We should take into account the fact that there has been a substantial increase in the percentage of coal mined by open-cut methods. To be sure, we have made real improvement but we should not take more credit than the facts of the case permit.

"In comparing European mine-accident rates with ours, we should remember that their percentage of non-productive workers is much larger than ours, resulting in distortion of comparative figures.

"I believe that the Ohio Division of Mines and the USBM would do the industry a service in evaluating safety progress if they would show accident-frequency rates separately for underground and open-cut mines. In our own company, we keep these figures separately and thus can evaluate progress in both types of mining."

General discussion in the meeting, following the formal papers, brought out the fact that operators and mineworkers alike are enjoying many advantages provided by "an unprecedented number of years of profitable operation in the industry," and that a good share of safety progress is the result of the industry's having money to invest in these improvements. To continue these advances, it was said, companies must continue to make profits.

Joint W. Va. Meeting . . .
Begins on p 116

1 lb a ton of washed coal, Mr. Snyder said. A 700-ton R-O-M storage bin permits one shift to process the 2-shift mine production. Full-seam mining with Joy loaders and Long Piggybacks includes heterogeneous bone and slate partings ranging from 1.32 to over 1.90 sp gr.

In answering questions, Mr. Snyder reported that to keep the plant simple they are wasting a small quantity of

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It Won't Ignite, burn or carry flame.

Resists Heat up to 230 F. Remains flexible. Won't dry out or crack — safely takes conductor heating overloads.

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Sized to fit bushings properly. Won't bruise, crush or cut under most conditions. Withstands the vibration and shock common in mine service.

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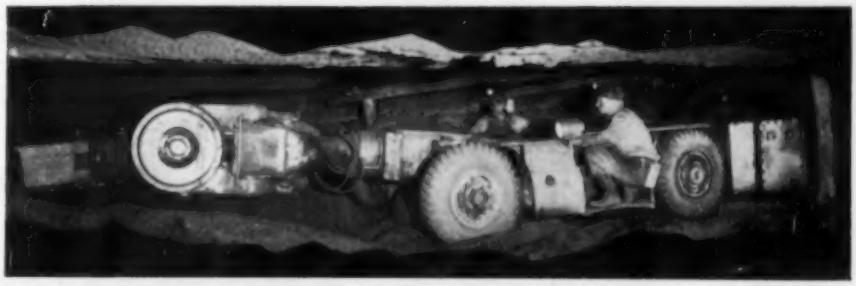

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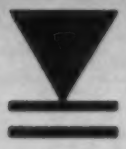
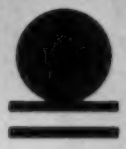


Tri-Rod for knife-like separation.



Round Rod for long-lived accuracy.

New Grizzly Rod combines the best features of round and tri-rod.

New Grizzly Rod with protective skid rod guards against abrasive action without sacrificing efficiency or percentage of open area.

fluctuating middlings product. Asked to comment on that phase of heavy-media cleaning, Mr. Skewes said that to get the last squeal out of the coal at Itmann plant of Pocahontas Fuel they have three heavy-media vessels operating at different gravities and have dry cleaning operating at a fourth gravity (*Coal Age*, October 1953, p 88). Middlings are marketed to utilities.

SELECTING DRYING EQUIPMENT

"Coal Driers and Related Equipment" were discussed by F. P. Calhoun, preparation manager, Rochester & Pittsburgh Coal Co., Indiana, Pa. Pointing out that the paper expressed his own personal opinions, Mr. Calhoun listed reasons for the selection of washing tables, a new-type horizontal rotating table vacuum filter, cyclone thickeners and a medium-velocity screen-type drier for a small plant put into operation in December, 1953. He presented a table of screen analyses of raw, cleaned and dewatered, filtered and heat-dried sizes to indicate degrees of degradation through the plant, as well as data on the percentage of the various mesh sizes in filtrate, clean boot, overflow, cyclone overflow, cyclone underflow and refuse boot overflow.

Cake thickness on the filter (45 tph of ¼ x 0 coal) is 4 in with ⅜ in not removed. The table requires 2.3 min to make a revolution. Vacuum is 8 in of mercury. Moisture in the filter cake averages 13.8%. In answering questions, Mr. Calhoun said that 100 hp is consumed in driving the reciprocating vacuum pump and that in experiments with a hood over 50% of the table and intake air heated to 450 F, a full 1% lower moisture was obtained, a reduction from 13.8 to 12.8.

LARGE-AUGER OPERATION

Compton high-capacity augers will produce 1.2% of the 1954 underground coal production of this country according to estimates, said D. M. Bondurant, sales manager, Compton, Inc. His paper dealt, for the most part, with engineering and economic considerations in determining the proper diameter and length of auger for the various seam thicknesses, uniformities and partings encountered. In 1953, Mr. Bondurant said, 34 Compton high-capacity units produced 2,200,000 tons of coal. The largest commercial auger is 52 in and only six units of this diameter are in use. The practical minimum diameter is 24 in.

PERMISSIBILITY CONSIDERATIONS

"I am confident," said M. J. Ankeny, safety director, Bituminous Coal Operators' Association, "that when the Bureau becomes fully aware of the problems and difficulties arising out of Public Law 522 concerning permissibility, appropriate steps will be taken to modernize and streamline the procedures and to coordinate them with the requirements of the law so that this important service will again be a benefit to the industry." He was referring to the U. S. Bureau of Mines' tradition of service to the industry and emphasized that it still exists. In

IN STRIP MINING...
"tons-per-hour" figures are the same as cash!

ALEMITE "ON-THE-JOB" LUBRICATION

1. SAVES TIME! By bringing clean, fresh lubricant right to the machines – where you need it, when you need it!

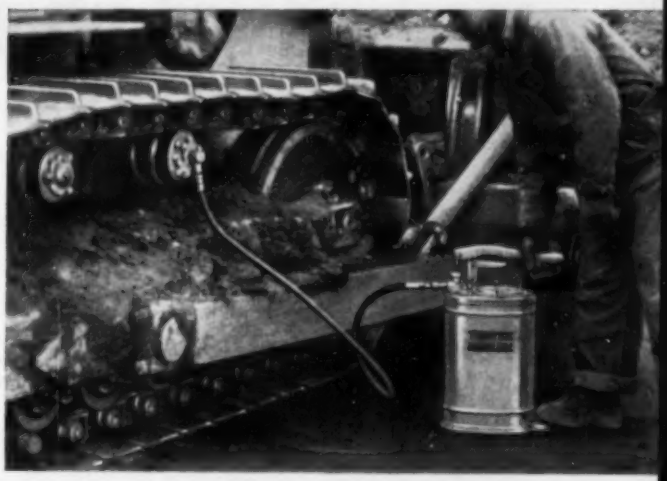
2. BOOSTS TONNAGE! By cutting expensive downtime for lubrication – increasing output of both men and machines!

3. SAVES MONEY! Nowhere are bearings beset by such dangers from grit and abrasion. Here's how to protect them, guard against costly breakdowns!

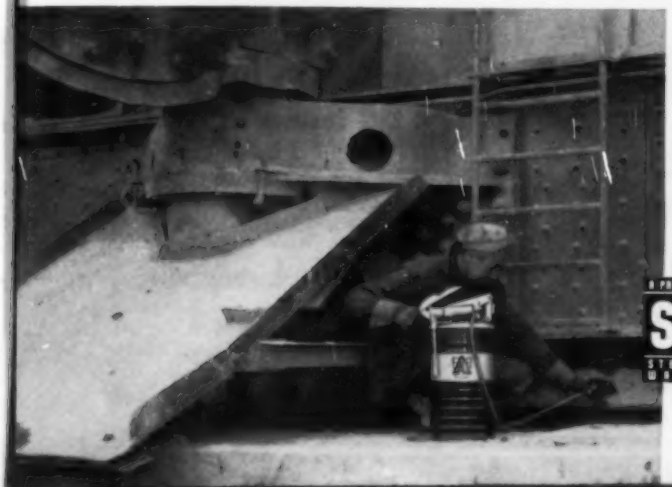
• Here the sheaves of a shovel get a shot of clean, new lubricant. Operator is using Alemite Hand Gun 1056-SE. This lever-type gun has plenty of power to push out old grease and dirt – has large capacity to serve many bearings without refilling!

• Alemite Loader Pump 7181-L fills a hand gun quickly – easily. Just eight strokes of the pump fills the gun completely, no mess, no waste, no troublesome air pockets. Lubricant is protected at all times from dirt, dust and grit that can ruin bearings.

• The track support rollers of this bulldozer are getting positive lubrication protection from this Alemite 6521-B Tractor Bucket Pump. 35-pound capacity means less time wasted in refilling, and lubricant reaches bearings "refinery clean." Fast – efficient!



• Here the roller track that carries the massive weight of a dragline and takes the tremendous pull from the boom is being lubricated with an Alemite 7137-A "RED-A" Bucket Pump. Pump provides 5,000 pounds pressure for positive lubrication, large capacity.



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ALEMITE

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ALEMITE, Dept. E-74
1850 Diversey Parkway, Chicago 14, Illinois

Gentlemen: Please send me your FREE illustrated booklet showing Alemite "On-the-Job" equipment and containing complete information on Alemite lubrication methods.

Name _____

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GRUVAGRIP
couplings and fittings

Gruvagrips are rugged, low cost couplings for grooved end pipe. Easy to apply and remove. Just 3 parts—synthetic rubber gasket and twin iron housings held by 2 bolts. Can be used over and over on 1½" to 14" grooved end pipe carrying air, gases, water, oil, chemicals, pulverized minerals, etc. **Gruvagrips** permit misalignment, allow for shock, end pull, vibration, up to 7° deflection.

Gruvagrip fittings. Long life and free flow are built into tough, shockproof metal. Sections are perfect circles inside and out. 100% reusable. Rust inhibitor prime coat. Sizes—¾" to 12".

Your supply houses carry **Gruvagrips** and a complete line of **Gruvagrip fittings.** Look them over this week, or write the manufacturer for full descriptions, list of users and prices.

Use plain end pipe? Write for information on Rolagrips, strong, light, handy couplings for plain end pipe.

GUSTIN-BACON MANUFACTURING CO.

210 West Tenth Street Kansas City, Missouri

his paper, "Electrical Problems Arising from Federal Safety Regulations," Mr. Ankeny defined and answered the principal questions that Public Law 552 and the Federal Mine Safety Code have developed regarding permissible face equipment.

The question creating the greatest disturbance today, he said, is this: "At our mine the face equipment was purchased as permissible equipment prior to the effective date of the Act, but on the effective date of the Act was in nonpermissible condition. Does the law require us to maintain this equipment in permissible condition?"

In answer, Mr. Ankeny stated: "The Bureau of Mines says that electric face equipment that was purchased as permissible type, except where permissibility of such equipment was voided by redesign or alteration—but not as a result of neglect—prior to July 16, 1952, or the date the mine became a gassy mine, whichever is later, will be regarded as permissible equipment irrespective of the state of maintenance as of the effective date of the Act or date of purchase. In other words, if the equipment was rendered nonpermissible by neglect, it will have to be restored to permissible condition and so maintained, but if it was rendered nonpermissible by redesign or alteration, it may be regarded as nonpermissible equipment and therefore need not be restored to permissible condition."

In regard to frame grounding and the 3-conductor cable which defeats the purpose of permissibility by limiting traveling range, Mr. Ankeny said that the Bureau has instructed its inspectors that application of Article VIII, Section 5b, of the Code is suspended temporarily with respect to off-track self-propelled or portable equipment powered through a trailing cable. Plans are under way to test four systems of ground-fault protection to get away from the third conductor, he said.

Ray Huffman, Monongahela Power Co., and a member of the AMC Underground Power Committee, said that some companies are already buying 2-conductor Type W cable and substituting it for the 3-conductor Type R. He personally thinks that the solution for grounding rubber-tired equipment is a ground-trip relay and a small third conductor.

In response to questions, Mr. Ankeny said that the Bureau has recently liberalized rulings to permit sectionalized room cables because it does not like piles of excess cable. Miller plugs can now be used back of the last open crosscut. Locomotives operating on grades in excess of 5% do not have to be fused. If a machine was permissible when the Act became effective but has been changed, the inspector can cite the operator and shut down the mine. Getting an extension from the Bureau is complicated and one operator has been trying to get one for 18 mo. Men must be withdrawn from a mine before appeals can be made to the Board.

GAS STORAGE UNDERGROUND

"Underground Gas Storage," a paper prepared by Paul H. Price, West Virginia state geologist, was read by O. L. Haught,

Assemble Aeroquip Hose Lines Right in the Field...

IN MINUTES!

Quick Replacement of Fuel, Lube, Air and Hydraulic Lines Keeps Equipment on the Job!

The difference between minimum downtime and wasted hours often depends upon the speed with which a damaged fuel, lube, air, or hydraulic line can be replaced. If you operate mobile equipment, Aeroquip bulk hose and detachable, reusable fittings will provide a compact, portable inventory that meets all your hose line replacement needs.

You can make assemblies on the spot by cutting bulk hose to required length and attaching the reusable fittings. This "Aeroquip Idea" gets equipment back on the job *fast*. For information, see your Aeroquip distributor or write us.

Edmier, Inc., one of Chicago's leading firms dealing in excavating, grading and construction materials hauling, operates more than 100 trucks and a large number of construction machines. To help reduce downtime, a supply of Aeroquip bulk hose and reusable fittings is on hand at all times.

Hose line replacements are made as they are needed. Here, Orville J. Wiley, Edmier Maintenance Foreman, reuses an Aeroquip fitting to make a new assembly for a Hough Payloader. Aeroquip hose line replacements are used for hydraulic systems on trucks and construction equipment, air systems on drag lines and cranes, and for greasing equipment in maintenance shops.

It takes only a few minutes to get the Payloader back on the job. Says Mr. Wiley: "There isn't any doubt that Aeroquip hose can withstand more abuse and flexing than any other hose we've ever used. Safety wise, it's the best. Not only has Aeroquip cut our maintenance replacement cost in half, it has also contributed a great savings in downtime and hydraulic oil loss."

Aeroquip

REG. TRADE MARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

SALES OFFICES: Burbank, Calif. • Dayton, Ohio • Hagerstown, Md. • High Point, N. C. • Miami Springs, Fla. • Minneapolis, Minn. Portland, Ore. • Van Wert, Ohio • Wichita, Kan • IN CANADA: Prenco Progress and Engineering Corporation Ltd., Toronto
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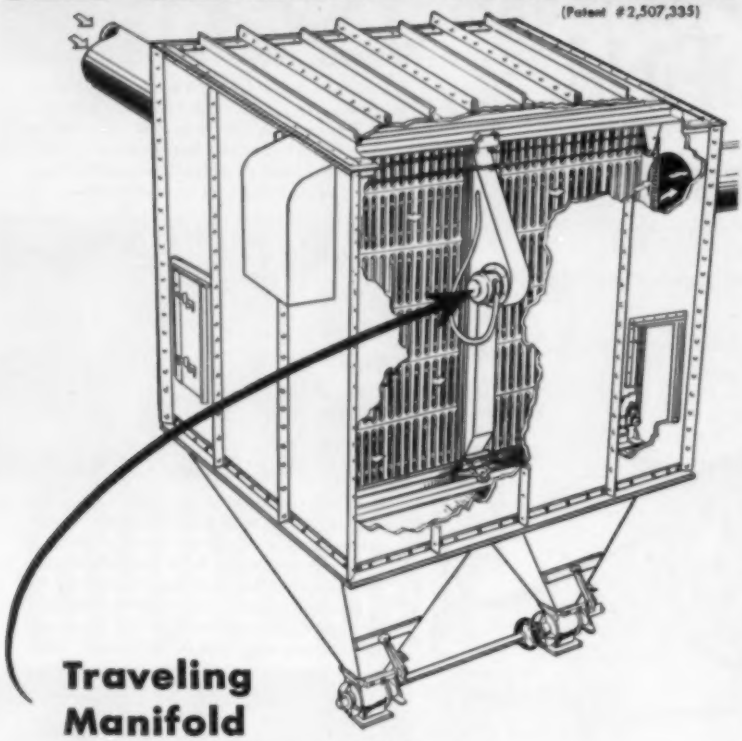
AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

• Continuous automatic operation
• Constant air volume and suction

with NEW PANGBORN
'SELF-CLEANING' COLLECTOR

(Patent #2,507,335)



Traveling Manifold
makes new collector self-cleaning

Now you can get continuous collector operation and constant system performance and efficiency with the new Pangborn "*Self-Cleaning*" Cloth Screen Dust Collector. Uniform air flow and resistance is assured without shutdown of the system for periodic cloth cleaning.

Write today for full details about the new Pangborn "*Self-Cleaning*" Collector that's economical to install, operate and maintain — gives you constant system performance and efficiency. Address: PANGBORN CORPORATION, 2800 Pangborn Boulevard, Hagerstown, Maryland.

Get all these important advantages

- Uniform air flow and suction
- Continuous, automatic operation
- Positive reverse air cloth cleaning
- High collection efficiency
- Reduced space requirements
- Low initial operating and maintenance costs
- Unit construction permitting flexibility of arrangement.

50th Anniversary Medallion

Pangborn
DUST CONTROL
STOPS THE DUST HOG from stealing profits

petroleum geologist, who works with Mr. Price. At least 15% of the Pittsburgh-seam coal has become dangerous to mine because of wells, the paper stated. Closely drilled areas have wells every 500 ft and when secondary recovery is begun wells will be drilled between them. It will be perhaps 50 yr before all the gas is recovered and the coal can be mined safely.

Superficially plugged wells in a repressured area are a great danger to mines in close proximity or a few hundred feet above the storage. There is no danger, Mr. Price maintained, from gas storage in the Oriskany sand which, where productive, is at least 4,000 ft below the coal, because all are recent wells of record that can and will be properly plugged.

W. B. Jamison, vice president, Jamison Coal & Coke Co., took unmistakable exception to storage even on the deep Oriskany sand. [illegible]ited instances of damaged casings to [illegible]e that man-made leaks can occur. Ver[illegible] C. Smith, consulting engineer and geologist, said that self interest of the gas company sees to it that there is no leakage from a gas storage.

LIMESTONE MINING

An Eimco No. 104 rocker shovel with 1¼-yd bucket is used in mining rooms 40 ft wide and 15 to 20 ft high in a limestone seam near Big Stone Gap, Va., reported G. B. Kneass Jr., Sunbright Div., Foote Mineral Co., Horton Summit, Va. Diesel-powered Euclid trucks carrying 8½ tons haul the high-grade limestone (96% calcium carbonate) out of the mine on an 8% grade. The diesels are without scrubbers but it is planned to put scrubbers on the Eimco shovel. Roof bolts are used and the recovery of limestone will be approximately 70% of the seam. The stone is used in processing lithium.

Among Manufacturers . . .

Begins on p 126

along with the need for greatly increased test-crush facilities, precipitated the move to West Chester, according to J. Wm. Schulze, company president.

U. S. Steel Names Div. Head

U. S. Steel Corp., Chicago, has appointed George R. Foster manager of the stainless-steel division, general sales department, U. S. Steel Supply Div. Joining U. S. Steel in Pittsburgh in 1943, Mr. Foster transferred to U. S. Steel Supply in 1947 as a salesman in that city, a position he held until his present appointment.

Quaker Rubber Acquires Firm

H. K. Porter Co., Inc., Pittsburgh, has announced acquisition of Pioneer Rubber Mills, Inc. Pittsburg, Calif., to become part of the Quaker Rubber Corp., one of H. K. Porter Co.'s nine divisions. Pioneer Rubber, which manufactures rubber belting, hose, packing and many other industrial rubber products similar to those manufactured by Quaker on the Atlantic Coast, will retain its identity, and Sumner M. Suhr, sales manager, who

Choose from this complete line of ratchet jacks for servicing all your equipment!

No. 516-MT	No. 1017	No. 1022	No. 2028
5-TON CAPACITY	10-TON CAPACITY	10-TON CAPACITY	20-TON CAPACITY

Every Duff-Norton Ratchet Jack is guaranteed at full capacity for loads applied to either head or foot lift.

Regardless of the type or kind of mining machinery or equipment that requires lifting, lowering or pushing, there's a safe, dependable, precision-made Duff-Norton Ratchet Jack that will do the job faster, easier, with less physical effort. The jacks shown here are only a few of the many Duff-Norton Ratchet Jacks designed and made expressly for rough, tough, day in and day out service in and around coal mines. All have the exclusive patented Duff-Norton *easily replaceable*, adjustable spring mechanism for long, positive, trouble-free service.

To get the complete story on how these and other Duff-Norton Jacks can save you time and money, see your local distributor or write to the world's oldest and largest manufacturer of lifting jacks for your free copy of "A Handy Guide for Selecting Duff-Norton Mine Jacks"—ask for catalog AD 10-J, The Duff-Norton Manufacturing Co., P. O. Box 1889, Pittsburgh 30, Pa. Canadian plant—Toronto 6, Ontario.

DUFF-NORTON *Jacks*

"Giving Industry a Lift Since 1883"

in shipment and in storage

At this modern cleaning plant coals destined for long shipment by rail and water are given a protective coating with PERMATREAT COAL SPRAY.

Air-borne moisture, wind, rain and sun attack un-treated coal in transport and in the stockpile. Long exposure to the elements may not only change chemical and physical properties but also reduce certain fusion and coking characteristics desired by the industrial user.

PERMATREAT seals coal against moisture penetration. It reduces segregation, prevents fine slack from settling to the bottom of the pile. Coals arrive at destination bright in appearance and dust-proofed for cleaner handling.

* *We congratulate the Island Creek Coal Sales Company on its 50th Anniversary — a half century of real progress in the coal industry.*

BEST FOR YOUR PERSONAL CAR

ASHLAND OIL & REFINING COMPANY
Ashland, Kentucky

Ashland
PERMATREAT
COAL SPRAY
Seals in Dust

New Plant Facilities Mark Rust-Oleum Expansion

"CUTTING THE TAPE" to officially open its new and enlarged plant facilities in Evanston, Ill., is Donald Fergusson, vice president of the Rust-Oleum Corp., during ceremonies this spring that marked the fourth new addition to the company's continuing program of plant expansion. The program "will enable us to continue our progress in new research and manufacturing techniques in the field of rust prevention, and it will also help us to keep pace with our distributors' demands around the world by providing greatly increased inventory warehousing space," said Mr. Fergusson.

has been with Pioneer since 1917, has been appointed manager of the new division under George A. Dauphinais, vice president and general manager of Quaker Rubber Corp.

O-B Sets Up Scholarships

Ohio Brass Co., Mansfield, Ohio, has established the Ohio Brass Foundation, a non-profit organization which will award scholarships on a competitive basis to students from its plant areas who seek a degree in chemistry, industrial chemistry, or chemical, metallurgical, ceramic, electrical, mechanical or industrial engineering. Scholarships cover all tuition and academic fees as well as up to one-half the normal board and room expense and will extend for 4- or 5-yr period depending upon the length of the course chosen. Successful applicants may attend any accredited college of their choice in the United States.

Mathieson, Olin Plan Merger

A joint announcement has been made by John M. Olin, president, Olin Industries, Inc., and Thomas S. Nichols, president and chairman, Mathieson Chemical Corp., that directors of the companies have voted unanimously to submit to their stockholders a proposal to merge the two companies. Following the merger, the name of the new company will be Olin Mathieson Chemical Corp. Mr. Olin will become chairman

In three Red Jacket Mines . . .

Typical installation of Koppers Pressure-Creosoted Mine Ties.

TIES
pressure-creosoted by Koppers
LAST LONGER

● Red Jacket Coal Corporation uses Koppers Pressure-Creosoted Ties in these three mines: Red Jacket Mine, West Virginia . . . Coal Mountain Mine, West Virginia . . . and Keen Mountain Mine, Virginia. Koppers Mine Ties last 4 to 5 times as long as ties made of untreated wood, thereby saving money in maintenance and replacement costs.

Here's the main reason why Koppers Pressure-Creosoted Ties retain their strength and last so long: in Koppers Pressure-Treating Process, wood is *not* merely dipped, soaked or brushed. Instead, creosote is forced —*under pressure* — deep into the wood, thoroughly protecting it against decay and termite attack. No wonder pressure-treatment with creosote offers a permanence that cannot be approached by any other preservative treatment.

Creosote comes from *your* coal. It is the most effective and the most widely-used wood preservative. Telephone poles and railroad ties by the millions have been protected by creosote. The combination of creosote—plus pressure-treatment—has proved to be unbeatable.

Koppers Pressure-Creosoted Wood saves money wherever wood must serve under severe conditions. That's just about every place in your mine, so send for our free booklet, "10 Proven Ways to Cut Mining Costs."

KOPPERS

KOPPERS COMPANY, INC.

PRESSURE-CREOSOTED WOOD

WOOD PRESERVING DIVISION
PITTSBURGH 19, PENNSYLVANIA

of the board of the new firm, and Mr. Nichols will be president.

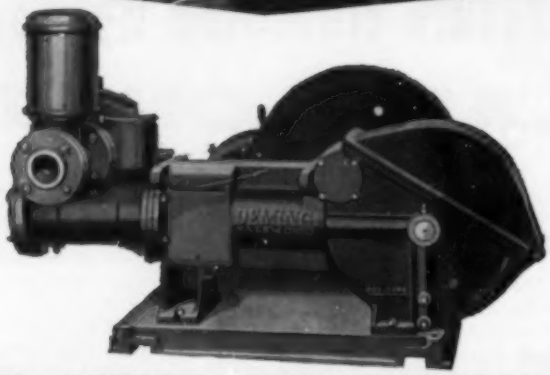
And For Your Information . . .

American Car & Foundry Co., New York, changed its corporate name on June 1 to ACF Industries, Inc., to reflect the diversification of products and services of the company.

The Dart Truck Co., Kansas City, Mo., has announced appointment of a number of new dealers since Jan. 1. The new domestic dealers whose sales are largely in construction equipment, include: Funkhouser Equipment, Kansas City, Mo.; Tractor & Equipment Co., Oak Lawn, Ill.; W. Va. Tractor & Equipment Co., Charleston, W. Va.; Cleveland Contractors Equip., Co., Cleveland, Ohio; Bowlake Equip. Co., Seattle, Wash.; Carroll & Edwards Equip. Co., Cincinnati, Ohio; and McCarthy, Jones & Woodard, Nashville, Tenn.

Goodyear Tire & Rubber Co.'s president, E. J. Thomas, recently unveiled a plaque in ceremonies held at Akron, Ohio, which named the world's largest conveyor belt press for H. D. Foster, manager of the company's industrial products division. Mr. Foster, who completed 40 yr of service with Goodyear several months ago, was instrumental in the development and installation of the belt press, which is approximately 42 ft long, 82 in wide and capable of vulcanizing conveyor belts up to 72 in in

Always Dependable



FOR MINE DEWATERING

Construction features of Deming Fig. 1896 "OIL-RITE" pumps assure top performance at low operating costs. Among the important features of these double-acting piston pumps are Timken Tapered Roller Bearings; Stainless Steel Piston Rod; Helical Cut Gear and Pinion; Quickly Accessible Rubber Valves on Bronze Grid Seats; and Automatic Lubrication. For heavy duty mine gathering service, you can depend upon Deming Fig. 1896 "OIL-RITE" Pumps. Write for Bulletin 1000-A.

THE DEMING COMPANY • 533 BROADWAY, SALEM, OHIO

Specify DEMING

DEPENDABLE MINE PUMPS

Who designed your NEW 160 foot CONVEYOR?

We did, right from the Barber-Greene REDI-FAB CATALOG

The B-G Redi-Fab series meets the needs of 2 out of 3 permanent conveyor installations

see your B-G distributor or write

Barber-Greene

AURORA, ILLINOIS, U. S. A.

HINGED PLATEGRIP

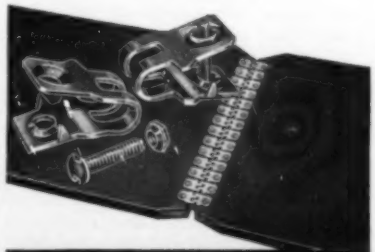
BELT FASTENER No. 500

FOR HEAVY CONVEYOR BELTS OF CHANGING LENGTH

These heavy-duty belt fasteners make a strong, flexible joint in conveyor belts, belts of any width and of from 3/8" to 1/2" thickness. They offer special advantages in mines, quarries or industrial setups where length or position of belt is frequently changed, because sections can be removed or added at will. Joints are opened for this purpose by simply pulling out the hinge pin.

Easily and quickly applied on the job or in the shop. Special design gives deep compression into belting and smooth, flush joint.

Write for Circular.



ARMSTRONG-BRAY & CO.

5340 Northwest Highway CHICAGO 30, U. S. A.

POWER-DOME V-8

World's most modern truck engines

Yours only with...

Never before in history has there been a truck engine like this! The new Dodge truck Power-Dome V-8 gets full power from regular gas, offers more miles to the gallon, operates at higher efficiency than any other mass-produced V-8! See your dependable Dodge truck dealer *today!*

Features of the future . . . found only in Dodge today!

Exclusive V-8 Power-Dome Combustion!

Unique dome-shaped heart of the Dodge truck V-8 develops more energy, expands gases more fully, wrings more power from every drop of fuel! Means top power now and for years to come!

Thrifty-powered Dodge truck 6's, too!

Famous-for-economy 6's also are found throughout the Dodge truck line. Twin carburetion and increased horsepower on many Dodge truck Sixes! Known everywhere for dependability.

DODGE "Job-Rated" TRUCKS

A BETTER DEAL FOR THE MAN AT THE WHEEL

if you want lower V-Belt costs—

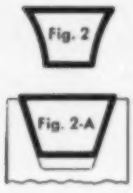
When a V-Belt bends, you can feel its sides change shape.

just make this simple test

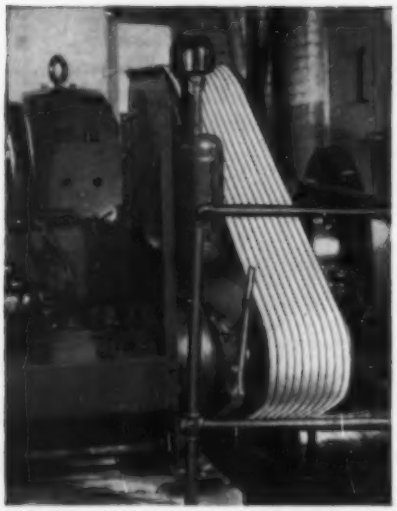
Take *any* V-belt that has *straight* sides (Fig. 1). Bend that V-belt while you grip its sides with your fingers. You will *feel* the sides *bulge out* (Fig. 1-A). Clearly, that out-bulge forces the belt to press *unevenly* against the V-pulley—and this *concentrates* wear at the points shown by arrows (Fig. 1-A).

Now bend a Gates Vulco Rope with CONCAVE SIDES (Fig. 2)

(U.S. PAT. NO. 1813698)



Instead of *bulging,* the precisely engineered CONCAVE SIDES merely *fill out* and become perfectly straight. This belt, when bent, *precisely fits* its sheave groove (Fig. 2-A). The sides of the Gates Vulco Rope press *evenly* against the V-pulley. Therefore, wear is distributed *uniformly* across the *full face* of this belt —resulting in *longer* belt life and *lower* belt *costs* for you!



Typical Gates Vulco Rope Drive —the Gates V-Belts are built with Concave Sides to insure longer belt wear.

When you buy V-belts, be sure to get the V-belt with the Concave Sides—the Gates Vulco Rope!

Gates VULCO ROPE DRIVES

REG. U.S. PAT. OFF.

Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

THE GATES RUBBER COMPANY
DENVER, U.S.A.

CS-548

Berwind-White Coal Mining Co. Maryland No. 2 at Wilmore, Pa.

Reitz Coal Co. Mine No. 4 at Central City, Pa.

Ebensburg Coal Co. No. 1 Mine at Colver, Pa.

Johnstown Coal & Coke Co. Logan No. 3 at Beaverdale, Pa.

SOMETHING NEW HAS BEEN ADDED TO 7 Central Pennsylvania Coal Preparation Plants!

Roberts & Schaefer Super-Airflow Cleaners are in daily operation in virtually every coal field. It is interesting to note, however, that Super-Airflow Cleaners were chosen independently by seven mines located within a small area of one state: Berwind-White Coal Mining Co. Maryland No. 2 at Wilmore; Reitz Coal Co. Mine No. 4 at Central City; Ebensburg Coal Co. No. 1 Mine at Colver; Johnstown Coal & Coke Co. Logan No. 3 at Beaverdale; Imperial Coal Corporation, Cambria Smokeless at Coalport and the Keystone Mine at Clymer; and Denise Coal Co. Mine No. 1 at Listie.

Only four of these modernized preparation plants are illustrated here, but they have sufficient divergencies to show that regardless of the nature of your preparation plant, R & S equipment can be installed without difficulty to keep it abreast of modern requirements by providing cleaner and better coal.

***Features of R & S Super-Airflow Cleaners* include:**

- **consistent, efficient cleaning of a wide range of sizes—up to 1⅝" and larger; down to 48 mesh.**
- **low-cost, trouble-free operation and far less maintenance even when capacities are big and sizing is not precise.**
- **separation of dust for recombining with clean coal when desired.**

Complete process descriptions and diagrams for various sizes gladly sent upon request. Ask for Bulletin No. 175.

ROBERTS & SCHAEFER COMPANY
Air-Washing, Wet Washing and Heavy-Media Separation Equipment
130 North Wells Street, Chicago 6, Illinois
1315 Oliver Bldg., Pittsburgh 22, Pa. — P. O. Box 675, Hibbing, Minn.
P. O. Box 570, Huntington 10, W. Va. — 254 W. 54th Street, New York 19, N. Y.
Foreign Department: International Mfg. & Equipment Co., 220 Broadway, New York 38, U.S.A.

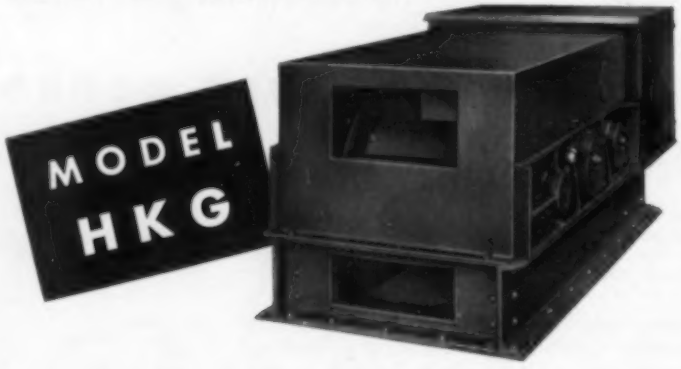
more efficient car control at loading points . . .

BROWN-FAYRO HOIST-RETARDERS

Six Model HKG Hoist-Retarders at a West Virginia Preparation Plant

Adequate design, rugged construction and operating ease make Brown-Fayro Hoist Retarders a prime factor in the economical, reliable handling of railroad cars on 2% to 2½% grades at tipples or other loading points. Simplified control from the trimmer's platform provides for "layer-loading" of cars for proper distribution of the product to meet market demands.

Brown-Fayro Hoist-Retarders are available in three models with varied capacities. Write today for full details.



Model HKG will lower and haul 2 to 3 railroad cars in tandem and can be located either between the tracks or at one side as illustrated above.

GENERAL SPECIFICATIONS

Dimensions: 34" high; 38" wide; 6,-5" long.
Weight complete with control, rope, snub sheave: 5,320 lb.
Rated capacity of rope drum: 525 feet of ¾" rope.
Power: 15 HP motor; rated 12,000 lbs. rope pull at 50 fpm.

TWO OTHER MODELS ALSO AVAILABLE

BROWN-FAYRO DIVISION
SANFORD-DAY IRON WORKS, INC.
JOHNSTOWN, PA.

width. Including accessory units, it covers an area of some 2,500 sq ft, weighing in excess of 600,000 lb.

National Tube Div., United States Steel Corp., Gary, Ind., has announced that it will begin immediate installation of equipment for the manufacture of plastic pipe. The installation will be located at the company's Gary Works and actual extrusion of pipe will start sometime in September. Screw-type extruders will be installed to manufacture ½- to 6-in pipe, and several plastic materials will be used, including polyethylene and polyvinyl chloride.

General Electric Co., Commercial Equipment Dept., Syracuse, N. Y., has named Neal F. Harmon sales manager for mobile communication equipment; Edwin W. Kenefake sales manager for microwave equipment; and James D. Helm sales manager for special accounts. Mr. Harmon, with G-E for 23 yr, has been coordinating the sale of communication equipment for civil defense and industrial applications. Mr. Kenefake has been assistant sales manager for communication equipment since 1950, and Mr. Helm was sales manager for special industrial accounts prior to his new appointment.

Kensington Steel Co., Chicago, Ill., has appointed Joseph F. Milmine sales engineer in the area of Kentucky, Tennessee, Georgia, North and South Carolina. Joining Kensington in 1936, Mr. Milmine advanced to the engineering department in 1938 and was appointed sales engineer in 1952.

Gar Wood Industries, Inc., Wayne, Mich., has named R. L. Schurhammer district manager, tractor equipment sales. Prior to joining Gar Wood in 1949 as a tractor equipment service representative, Mr. Schurhammer was employed by Peter Kiewit Sons' Co., Omaha.

Flexible Steel Lacing Co., Chicago, has appointed Jack Graham of Toronto, to represent the company in the Provinces of Ontario and Quebec. A graduate engineer of the University of Toronto, Mr. Graham has been employed, since 1937, in the steel, foundry and mining industries.

The Construction Materials Div. of General Electric has named Howard M. McNeil wire and cable specialist of its central and northwestern districts, with headquarters in Denver, Colo. Mr. McNeil, who joined G-E in 1950, was prior to his present assignment a proposition engineer for the wire and cable department at Bridgeport.

Fairbanks, Morse & Co. has appointed R. H. Morse III assistant to the vice president in charge of sales, with headquarters in Chicago. Mr. Morse has been located in Beloit, Wis., for the past 8 yr and has been general manager of the Beloit plant for the last 2 yr.

Olin Industries, Inc., has appointed W. L. Ashlock and H. F. Grote, formerly sales representatives, regional sales managers for the Metals Div. Mr. Ashlock will be located at the company's

LIMA Type 2400 dragline stripping overburden at open cast coal site in Northern England.

Two LIMA Machines working on harbor construction project in Aden.

George Wimpey & Company, Ltd. report:

"We purchased our first **LIMA** in 1947. Today we rely on **50 LIMAS** in United Kingdom, Aden, South Africa and Borneo"

Large Lima excavators and cranes are standard equipment now for George Wimpey & Company, Ltd., one of the United Kingdom's largest civil engineering contractors. Ten Lima type 802's, thirty-three 1201's and seven 2400's are moving about 10,000,000 cubic yards yearly for Wimpey. Their diverse, world-wide operations include stripping overburden at open cast coal sites in the United Kingdom, harbor and refinery construction in Aden, dam building in South Africa and pile driving in Borneo.

After their first machine in 1947 proved very satisfactory, Messrs. Wimpey decided to standardize on Lima machines for all large excavators not made in the United Kingdom. This standardization has benefited them two ways:

1. Lima machines have given Wimpey the reliability and high output required for continuous, economical operation.
2. Uniformity and ready availability of replacement parts throughout the world, have avoided costly delays due to idle equipment.

It will pay you, too, to standardize on Lima for shovels, cranes and draglines.

BEFORE you buy any machine, **COMPARE** carefully all important features **LIMA** offers you:

1. Bronze bushings in tread, idler and drive rollers are protected by piston-ring type dirt seal rings and retainers.
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3. Main machinery is placed well back of center of rotation to eliminate excess counterweight.
4. Anti-friction bearings, used at all important bearing points, reduce destructive friction, fuel consumption and lubrication requirements.
5. Big capacity drums and sheaves lengthen cable life by reducing the need for double wrapping and sharp bends in cable.
6. Machine cut propel and swing gears and roller chain power take-off are enclosed in a sealed oil bath for dirt elimination and smoother, quieter operation.
7. Torque converter (optional) automatically adjusts speed to load requirements, minimizing shock loading, making performance smoother and faster. (Standard on Type 2400 shovel).
8. Full air controls on travel, hoist, swing and boom hoist, result in smoother, more precise operation, minimum maintenance and less operator fatigue.

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Construction Equipment Division

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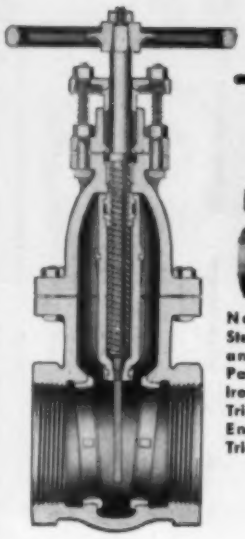
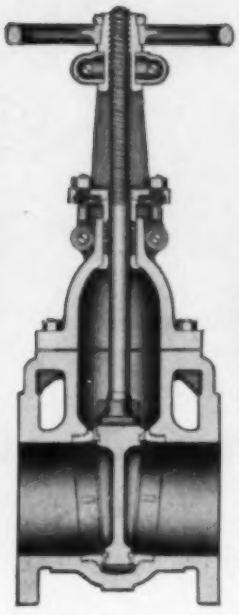


Non-Rising Stem; Screwed and Flanged Patterns; All-Iron or Brass Trimmed. Hub Ends, Brass Trimmed only.



Outside Screw and Yoke; Screwed and Flanged Patterns; All-Iron or Brass Trimmed. Also available with brass seats and steel stem.

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Here's the big value—the big selection: CRANE 125-Pound Iron Body Wedge Gates

. . . with quality features that assure exactly the kind of service you want. Body and bonnet are oval-shaped with extra metal where it's needed most, to provide liberal strength. Flanged patterns have tie-ribs between body and bonnet flanges. You also get a solid web-type disc with long guides . . . a stem of liberal diameter with long thread engagement . . . an exceptionally deep stuffing box with high-grade packing . . . a two-piece ball-type gland and flange—plus an easy-to-grip handwheel with oval-shaped rim. Non-rising stem valves have a brass bushed stem collar. OS&Y design includes a brass bonnet bushing, swinging eye bolts . . . and a tee-head disc-stem connection on sizes 12-inch and smaller.

Big selection includes all-iron or brass trimmed valves . . . Underwriters' pattern valves, quick-opening types . . . valves for process industries . . . valves for marine service. Sizes up to 48-inch. Check your Crane Catalog or ask your Crane Representative next time he calls.

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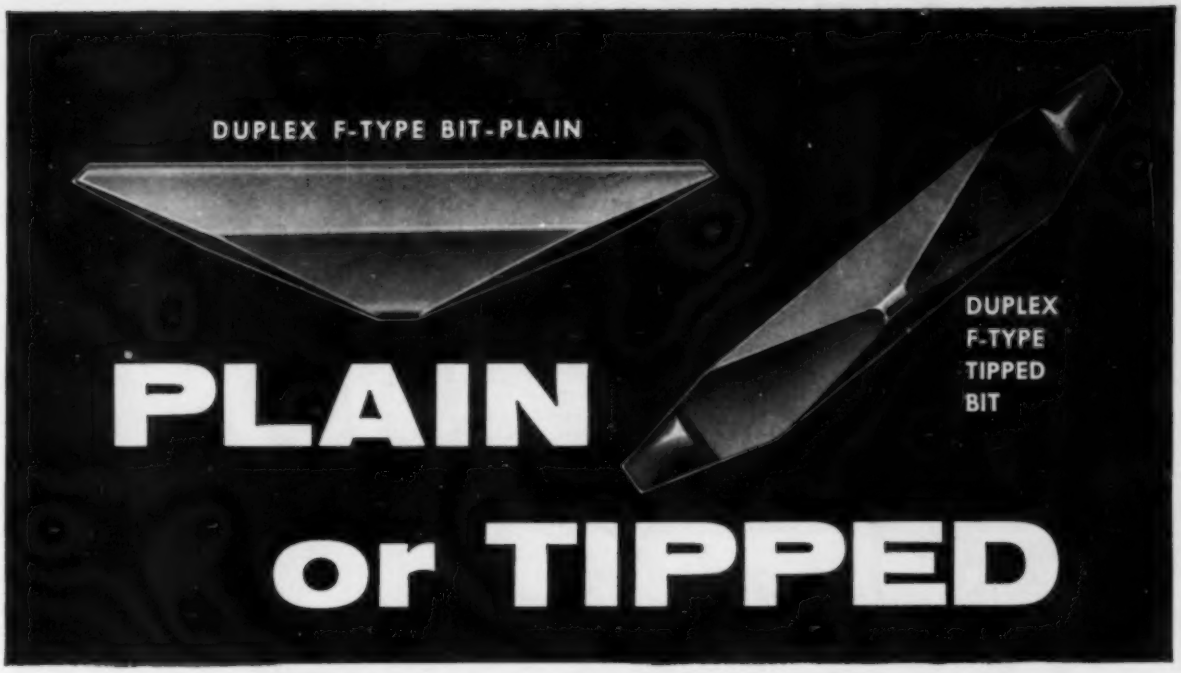

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I LIKE "CINCINNATI" FOR ITS ECONOMY

ONCE again "Cincinnati" has met the challenge to produce a broader line of bits to provide greater cutting economy and efficiency regardless of your individual cutting problem. Latest in the "Cincinnati" complete line of bits are the DUPLEX F-TYPE PLAIN BIT and the DUPLEX F-TYPE TIPPED BIT.

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LUBRIPLATE DIVISION
Fiske Brothers Refining Co.
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New Haven, Conn., plant and Mr. Grote will be located at Cleveland, Ohio. E. M. Grady has been named customer service manager at the Metals Div.'s headquarters in E. Alton, Ill., and E. R. Hack has been named to the same position at New Haven.

General Electric Co., has reported ground-breaking at Indianapolis, Ind., for a new G-E apparatus service shop, 36th in the company's nationwide chain. The ultra-modern, one-story 17,000-sq-ft shop was planned to provide fast and efficient round-the-clock service, warehouse facilities, and reduced transportation costs to Indianapolis area apparatus users, and will be equipped to handle repair and service operations on all G-E apparatus-type equipment. It will cover the territory handled heretofore by the company's Cincinnati, St. Louis, and Chicago service facilities.

Simplex Wire & Cable Co., Cambridge, Mass., has announced the promotion of J. E. Auchmoody from assistant to president, to comptroller for the company. Mr. Auchmoody has spent most of his business life in accounting and financial work and is certified as a public accountant in both New York and Massachusetts.

Atlas Chain & Mfg. Co. has opened its new home office and factory at 288 N. Main St., Doylestown, Pa. The new Doylestown headquarters augment the northeast Philadelphia plant which, for the present, remains in operation. As part of a plan to increase and centralize production facilities, and to gain space for future expansion, plans call for an eventual transfer of the entire Atlas establishment to Doylestown.

The Electric Equipment Co., Rochester, N. Y., completed 20 yr of service to industry on June 4. During that period the firm has supplied a total of more than 5,000,000 hp of guaranteed rebuilt electric motors, generators and transformers to industries in the United States, it reports. Irving S. Norry, president, has been named chairman of the board, and will be succeeded as president by Sidney Gilbert.

Galion Allsteel Body Co., Galion, Ohio, has appointed R. H. Tomlinson eastern division sales manager. Mr. Tomlinson, who will direct sales and service in all states east of the Mississippi, formerly was regional representative in Kentucky, Alabama, Mississippi, Louisiana and Arkansas.

The Heil Co., Milwaukee, Wis., has appointed Hoffman Auto Body Service, Inc., 1480 N. Grant St., Columbus, Ohio, a distributor for its complete line in 19 counties in Ohio.

Laminated & Insulating Products Dept., General Electric Co., Coshocton, Ohio, has appointed Arthur C. Treece manager-marketing. Mr. Treece, who joined G-E in 1922 at Ft. Wayne, had been manager, employee and plant community relations for the Chemical Div. prior to his appointment.

GUYAN RESISTORS

Above is a typical design of all GUYAN RESISTORS including standard boxes and mining equipment resistors.

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Mechanical Mining Service Co., Morgantown, W. Va.
Mill & Mine Supply Company, Birmingham, Ala.
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Means More Production!

Manitowoc 4500 with 5½ yard dipper stripping ore.

Manitowoc 4500 with 140' boom and 4½ yd. dragline stripping and stockpiling coal.

The mighty Manitowoc 4500 is the big "pro" of mining operations all over the country — the complete answer on "how to get more production — more profit per shift."

Look at Manitowoc's features that mean bigger yardage on every job — smooth, positive-action torque converter; fast operating cycles; special design long-reaching booms; hi-lift shovels; crawler-type mounting for faster traveling over all kinds of grades up to 30%; complete diesel operation which permits traveling anywhere without a trailing cable or electric supply; wide pads and wide crawlers that result in far lower ground pressure.

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"Fraction of an inch" control by either hand throttle or foot accelerator, without slipping clutches or shifting speeds.

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Cushion of oil absorbs jarring impacts which saves cables, clutches and machine assemblies.

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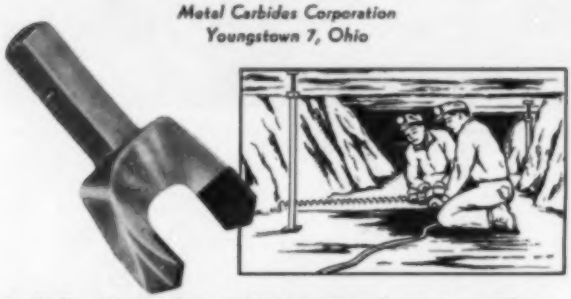

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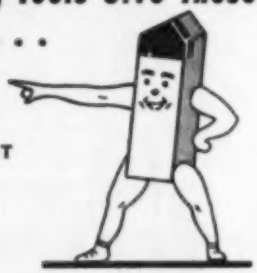

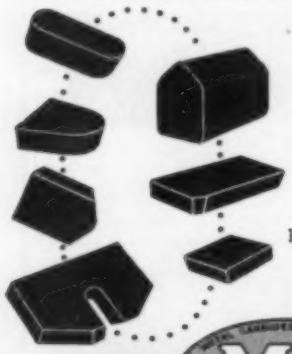

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- *with hydraulic feed*
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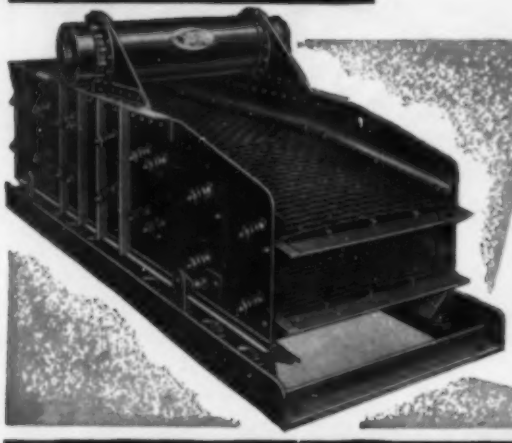

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HIGH-LIFT SHOVELS
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1—Joy Continuous Miner, low vein.
2—14 BU low pedestal Loaders, 10 H.P. motors, Type 7AE.
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2—6BU Loaders, one 33½" high.
2—11 BU Joy Loaders, hi capacity.
4—Joy T2-5 Cat Trucks, low pan, 1-T2-6.
1—Joy T1 Standard Cat Truck.
2—Joy 30" Belt Conveyors, 1000' & 2000' centers. Like new.
2—Joy 11B low vein Cutting Machines, 35 and 50 H.P.
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4—42E Shuttle Cars, as is or rebuilt.
10—32E9 Shuttle Cars.
2—32E10 Shuttle Cars, perfect.
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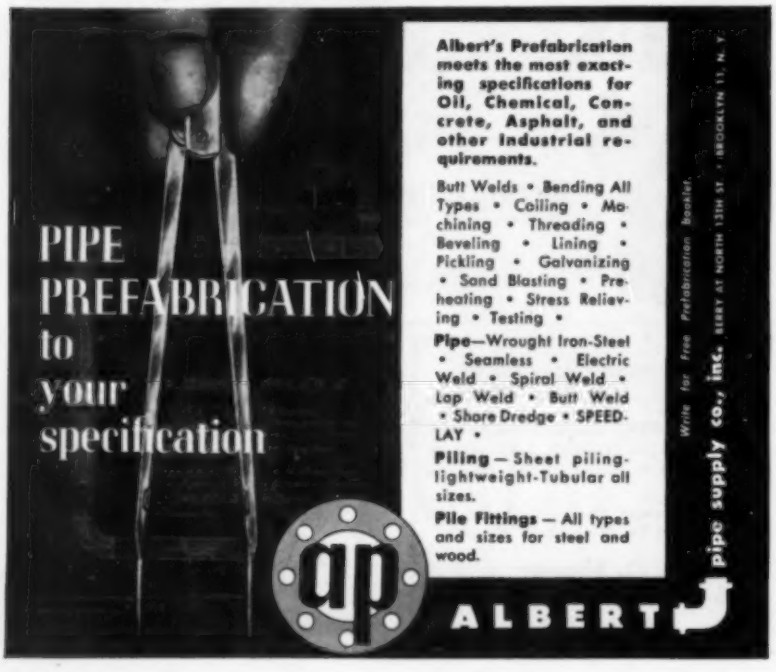

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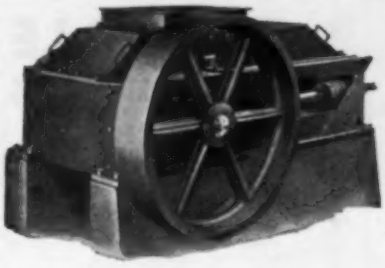

COAL CRUSHERS

1—18" x 18" Jeffrey single roll
1—24" x 24" Jeffrey single roll
1—24" x 36" McNally-Pittsburg double roll
1—36" x 42" double roll
1—30" x 16" Williams pulverizer
1—36" x 48" Jeffrey hammermill

TUGGER & SLUSHER HOISTS

1—5 HP Brownie room hoist
1—5 HP Sullivan RH room hoist
1—7½ HP Sullivan double drum slusher hoist
2—10 HP Sullivan 3 drum slusher hoist
1—Ingersoll-Rand mod. 6HC air tugger hoist
2—6½ HP Sullivan tuggers, 250 v. DC
7—6¼ HP Sullivan double drum, 250 v. DC
1—10 HP Sullivan double drum driven by Continental gascline engine

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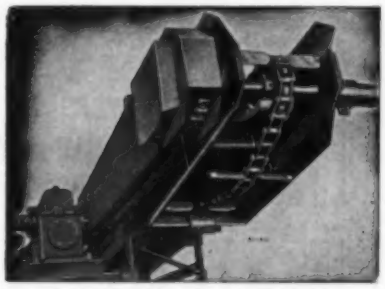
3—Ottumwa 20 HP box car loaders
2—Manierre 22 HP box car loaders
1—Jeffrey 20 HP box car loader
2—Red Devil portable loaders, 12'x15"
1—Card portable loader, 11'x19"

SCRAPER CONVEYORS

1—Link Belt, 50' centers, 12" flights
1—Jeffrey, 75' centers, 9" flights
1—Jeffrey, 67' centers, 30" flights
1—Jeffrey, 70' centers, 30" flights
1—Jeffrey, 72' centers, 30" flights
1—Jeffrey, 88' centers, 36" flights
1—Jeffrey drag, 28' centers, 9" drags
1—Jeffrey drag, 26' centers, 30" drags

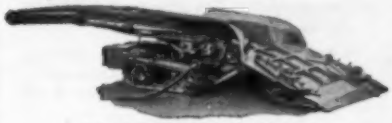
ROTARY DUMPER

1—Card rotary car dumper, 13'x5' platform



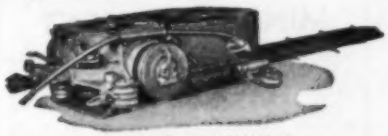
ELECTRIC HOISTS

1—11 HP Vulcan #0 single drum
1—20 HP Vulcan single drum
1—22 HP Vulcan double drum
1—25 HP Vulcan single drum
1—30 HP Vulcan single drum
1—37 HP single drum
5—50 HP single drum
2—60 HP single drum
4—100 HP Box single drum
1—112 HP Vulcan single drum
1—145 HP Vulcan single drum
2—150 HP Vulcan single drum
1—375 HP Box Single Drum Hoist, 800 FPM with 375 HP GE Slipring Motor, 575 RPM, complete with controller, grids and magnetic contact panel.
1—600 HP Box Single Drum Hoist, 25,000# Rope Pull, 900 FPM, Hydraulic Post Breaks with 600 HP Westinghouse Slipring Motor, 435 RPM, controls and magnetic contact panel.



LOADERS & CONVEYORS

1—8BU Joy loader
1—61EW Jeffrey elevating chain conveyors
1—61HG Jeffrey chain conveyor, 90'
1—61W Jeffrey chain conveyor, 200'
9—G-20 Goodman shaker conveyors
6—G-15 Goodman shaker conveyors
8—Vulcan shaker conveyors
2—Joy ladel UN-17 shaker conveyors
10—Goodman HA duckbills



MINING MACHINES

2—7B Sullivan super short wall coal cutters
18—CE7 Sullivan coal cutters
1—CR3 Sullivan coal cutter
1—Jeffrey 28A coal cutter
6—Goodman 112-A coal cutter
1—Sullivan CH-11 ironclad shearing machine
1—Jeffrey 29-C Arcwall coal cutter

SCALES

3—100 ton Fairbanks railroad scales
1—100 ton Howe railroad scale
1—125 ton Howe railroad scale
1—5000# Fairbanks Tipple scale with weighing basket
1—5000# Howe Tipple scale

SCREENS

5—3'x5' Tyler "Hummer" electric vibrating screen
1—42"x72" Jeffrey-Traylor electric vibrating screen
1—48"x84" Jeffrey-Traylor electric vibrating screen
1—40"x100" Tyler-Niagara 2 deck shaking screen
2—4'x12' Tyler Ty-rock 3 deck shaking screen
1—2 deck shaking screen, 18'x86"
1—4 deck shaking screen, 32'x84"

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125—60 cu. ft. Card steel coal mine cars 36" ga.
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2—Joy Shuttle Cars, Model 42D5.

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2—50 ton capacity steel bins

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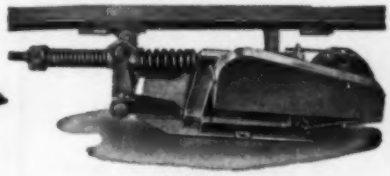
2—108" Card bicycle sheave wheels
2—96" wood filled sheaves
2—84" Card bicycle sheave wheels
3—72" bicycle sheave wheels

MINE FANS & BLOWERS

2—8-H Jeffrey 42" Aerodyne fans
1—7' Jeffrey Aerovane 2 stage fan
2—Jeffrey #61 exhaust blowers
2—96" wood filled sheaves
7—Jeffrey Aerodyne midget blowers
1—2600 cfm Brown-Fayro exhaust blower
2—3000 cfm Claridge exhaust blowers

PICKING TABLES

1—Link-Belt, 20' centers, 18" pans
1—Card, 41'6" centers, 30" pans
1—Card, 51' centers, 48" pans
1—73' centers, 30" pans
1—64' centers, 48" pans



ELEVATORS

1—Link-Belt, 42' centers, 6"x4" buckets, single chain, complete with steel housing
1—Link-Belt, 36' centers, 18"x8" buckets, double chain
1—12' centers, 14"x7" buckets on belt
1—35' centers, 10"x5" buckets on belt

BELT CONVEYORS

1—Jeffrey 24"x13'
1—Barber-Greene, 24"x66'
1—Barber-Greene, 24"x135'
1—Barber-Grene, 30"x173'

LOCOMOTIVES

1—2 ton Whitcomb, battery, 24" ga.
2—2½-3½ ton Mancha battery, 24" ga.
1—4 ton Westinghouse-Baldwin battery, 24" ga.
1—4 ton Ironton, battery, 36" ga.
2—7 ton G.E. permissible battery, 36" ga.
1—7 ton Atlas, battery, 36" ga.
3—8 ton Ironton battery, 36" ga.
2—8 ton G.E. battery, 36" ga.
2—8 ton Goodman battery, 36" ga.
4—10 ton Atlas battery, 36" ga.
1—3 ton Whitcomb gas engine driven, 24" ga.
1—2½ ton Jeffrey trolley, 36" ga.
1—4½ ton Goodman trolley, 36" ga.
1—5 ton Jeffrey trolley, 36" ga.
1—6 ton Goodman trolley, 36" ga.

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Have several late type 14-BU, 8-BU, and 11-BU 250 V DC Joy Loading Machines; several 5-SC, 6-SC and 42-E Joy Shuttle Cars with Magnetax controls and airplane brakes.

Bargain to offer in 200 KW and 300 KW Rotary Converters and Motor Generator Sets.

2—Link-Belt 5-cell Wash Boxes, capacity 150 TPH and 350 TPH.

300—Sanford-Day, 42" gauge, all steel Rotary Dump Mine Cars, 14" Timken bearing wheels, height from rail 40", outside length 12', width outside bed 6', length overall including semi-automatic couplings 14', level full capacity 4 tons. Cost new in 1948—$900.00 each. Bargain for only $225.00 each. In practically new condition. Complete with Roberts & Schaefer Rotary Mine Car Dump, push button control.

138—Sanford-Day 3-door Drop Bottom Mine Cars, 42" gauge, width 6', length 12', ht. from top of rail to top of car—32", 16" ballbearing cast steel wheels, 3¼" axle, wheel base 46", capacity 172.8 cu. ft., constructed of ¼" steel. Cost approximately $1000.00 each in 1951, and used only a short time. In practically new condition. Can offer for only $225.00 each.

All types of cat and rubber tire mounted Cutting Machines, rebuilt Locomotives from 6-ton to 20-ton for any track gauge.

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2—11BU-7E Joy Loading Machines, w/Serial #5035 and 5059
1—11BU-8PE Joy Loading Machine, w/Serial #5173 (Hyd. Pump in bumper)
3—29U Jeffrey Cutting Machines, Rubber/mtd., Serial Numbers: 25142; 21569 & 24594
1—29U Jeffrey Cutting Machine, Track/mtd. Serial #21895
1—DAA-1 Baker-Fletcher Roof Control Drill, Serial #52, 4/24" Cir. Saw/attached & spare BT-103 Unit w/hyd. Motor Swivels, Rubber mtd.
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LOCOMOTIVES—6 to 15 Ton 42" Track Gauge, 250 volts. Jeffrey, Goodman, General Electric and Westinghouse.
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JEROME MINE
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DRILLS: 5 Jeffrey A-6 Post type.
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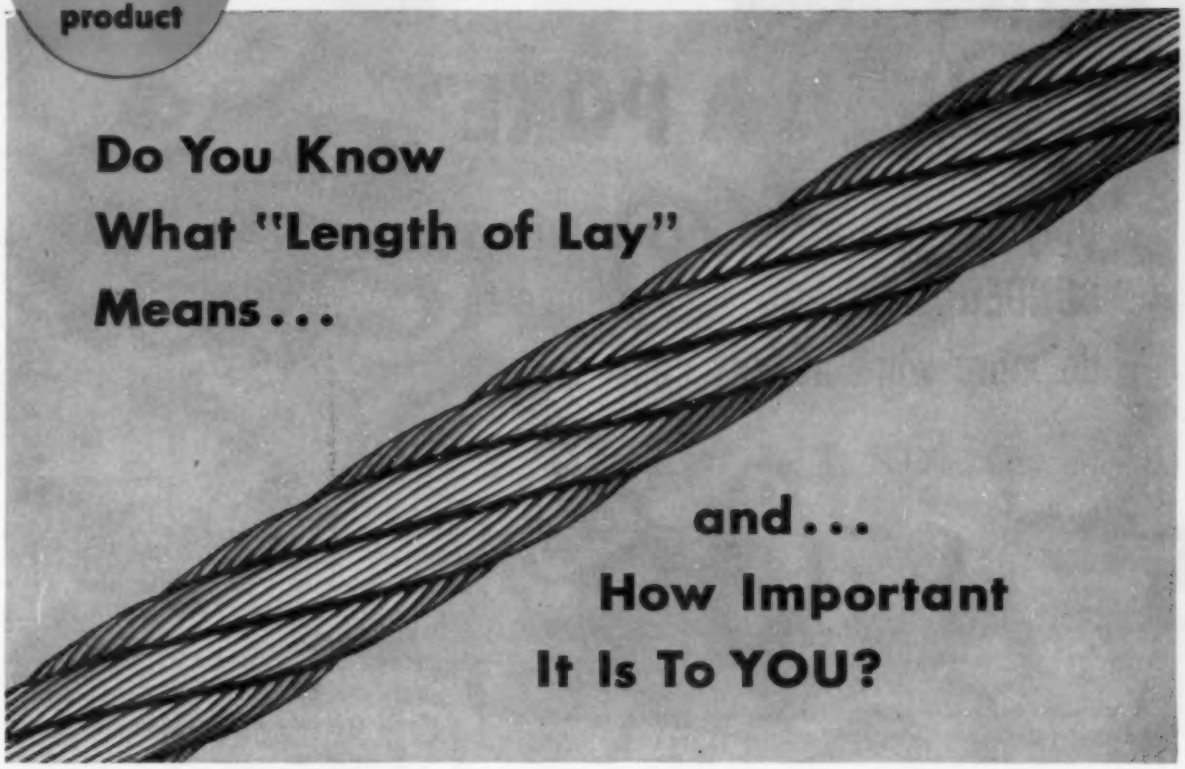
an **ACCO** product

AMERICAN CABLE

"GREEN STRAND" WIRE ROPE



Length of lay is the distance allowed for a strand to make one complete turn around the wire rope. This distance varies depending upon the construction and diameter of the rope, and upon the service requirements. The service factors which must be considered are elasticity, flexibility, stability, resistance to abrasion, and strength.

Elasticity is desired in order that a wire rope may absorb the application of loads gradually and not with sudden shock. The shorter the lay, the more elasticity in the rope. The reverse is also true.

Flexibility is that quality which a rope possesses which permits it to be flexed or bent around sheaves and drums. This property is desired from a standpoint of fatigue resistance of wires in a rope when subjected to bending stresses. An increase in length of rope lay tends to make the rope less flexible. This does not necessarily mean that a rope with a longer lay would also have less resistance to bending fatigue with which the term flexibility is often confused.

Stability of construction can be described best by observing the result of twisting the ends of a towel in opposite directions. You will find that the structure becomes harder with the increase in the amount of twisting. It will resist distortion when outside compressive force is applied. The same is true in a strand or in a finished rope. In effect, the shorter the lay the more it will resist crushing.

Abrasion resistance would seem to require more and larger crown wires per foot exposed to wear. Shortening the lay exposes more crown wires and makes the rope more flexible so larger diameter wires can be used. Then it becomes a matter for our engineers to set the length of lay to provide abrasion resistance but not at the expense of the other factors.

Strength of a wire rope is definitely influenced by the length of its rope lay. Of two ropes, identical except for their rope lay, the one with the longer lay will be stronger. Although the shortening of lays tends towards certain desirable conditions, a critical point is always reached beyond which the lay cannot be shortened without making the rope stiff.

If all this sounds mighty complicated, forget it. We don't expect you to become a wire rope engineer. That's our job—to engineer and make the best possible wire rope for you. In our "Wire Rope Recommendations for General Contractors" you will find the correct constructions of TRU-LAY Preformed "Green Strand" for your equipment. See your American Cable distributor or write us for a copy of **No. 128-B.**

ACCO

American Cable Division

AMERICAN CHAIN & CABLE

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn.

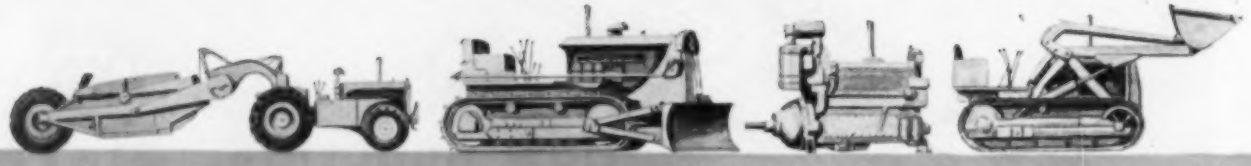
plus ACCO Registered Wire Rope Slings

In the market for used equipment?

DON'T BUY A "PIG IN A POKE"

Only your Caterpillar Dealer offers "BONDED BUY" in used machines to do more work at less cost

BONDED BUY



You know what you're getting when you buy used heavy-duty equipment from your Caterpillar Dealer. Only your Caterpillar Dealer gives you a selection of machines in three clear-cut classes for all phases of mine and quarry work: stripping, haul road construction and maintenance, pioneering, materials handling, compressor and jumbo drill work, etc.

A $10,000 GUARANTEE says that your best buy is a "BONDED BUY." It's available only on Caterpillar equipment, and only from your Caterpillar Dealer.

Next best selections are "Certified Buy" and "Buy and Try"—both guaranteed in writing by your dealer. These cover used machines of any make.

Every item on your Caterpillar Dealer's lot—engine, tractor, motor grader, earthmoving equipment and other machinery—is honestly tagged in one of these three classes, and backed in writing.

Whether you want one machine, a few, or many, your Caterpillar Dealer is your best source of new and used equipment. He posts a bond only on used Caterpillar-built equipment because he can count on—and *you* can count on—the traditional ruggedness and long, trouble-free work life of these husky yellow machines. See him for full details on this *exclusive* across-the-board guarantee. Do it today, while his selection is at its peak!

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR

REG. U. S. PAT. OFF.

BEST BUYS IN NEW AND USED EQUIPMENT

DON'T GUESS OR GAMBLE—
Only your Caterpillar Dealer offers a $10,000 bond on used equipment

Your Caterpillar Dealer offers you three clear-cut classes of used equipment. He backs each one in writing. You buy with confidence, sure that the equipment is honestly described. See him for the best values on the market!

(1) "BONDED BUY." Only the best in used Caterpillar-built equipment. Each "BONDED BUY" machine is backed by a Dealer's Guarantee Bond equal to the purchase price of the machine up to a maximum of $10,000. This provides a guarantee for thirty days against unsatisfactory performance due to defective parts. If a part should prove defective within the guarantee period under the normal conditions of your job and with proper maintenance, your dealer will put your machine back into operating condition *with no charge to you for parts and labor* up to the amount of the bond. The Dealer's Guarantee Bond is backed by The Travelers Indemnity Company. Your Caterpillar Dealer gives you this protection, at no cost to you, with your purchase of a "BONDED BUY" machine. Look for the "BONDED BUY" symbol—your assurance of the best in used equipment.

(2) "CERTIFIED BUY." This is your next best buy in used equipment. "Certified Buy" covers machines of any make in good condition. Your performance guarantee is in writing backed by your Caterpillar Dealer.

(3) "BUY AND TRY." Bargains in used machines of any make. Buy and try them for a period mutually agreed upon by you and your Caterpillar Dealer. "Buy and Try" machines carry his written "money-back" agreement.

"BONDED BUY" ***assurance effective in the United States and Canada***

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DIESEL ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

for a repair splice

...or a permanent connection

pullout strengths up to 6,000 lbs.

flexible mine cable from #8—4/0

The illustration above shows #4 flexible mining cable. The short repair splices shown will stand a pullout strength of over 1600 lbs. Notice that the finished connections are actually smaller in diameter than the insulated cable they join. Easy to tape and so short they'll run smoothly through sheaves and over reels. Properly vulcanized they form a permanent splice. • Strong enough for rugged hauling • Short enough for easy reeling • Chamfered edges protect cable • Double indents for extreme tension.

One simple hand tool installs all cable sizes. Setting plate on head indicates thumb screw adjustment for each cable size.

BURNDY

54-11

NORWALK, CONNECT. — TORONTO, CANADA • *Factories:* NEW YORK, CALIF., TORONTO • *Export:* PHILIPS EXPORT COMPANY

PROOF: 9 more mines report:

Multi-Louvre Dryers are unmatched for efficient heat-drying of coal

1 ILLINOIS

Reduces surface moisture of slurry from 12% to 1%. Mine now markets product from its slurry dump.

2 WEST VIRGINIA
Pocahontas No. 3 Seam

Only one man attends four dryers. Output: 460 tph of ¾" x 0" metallurgical coal.

3 INDIANA
No. 5 Seam

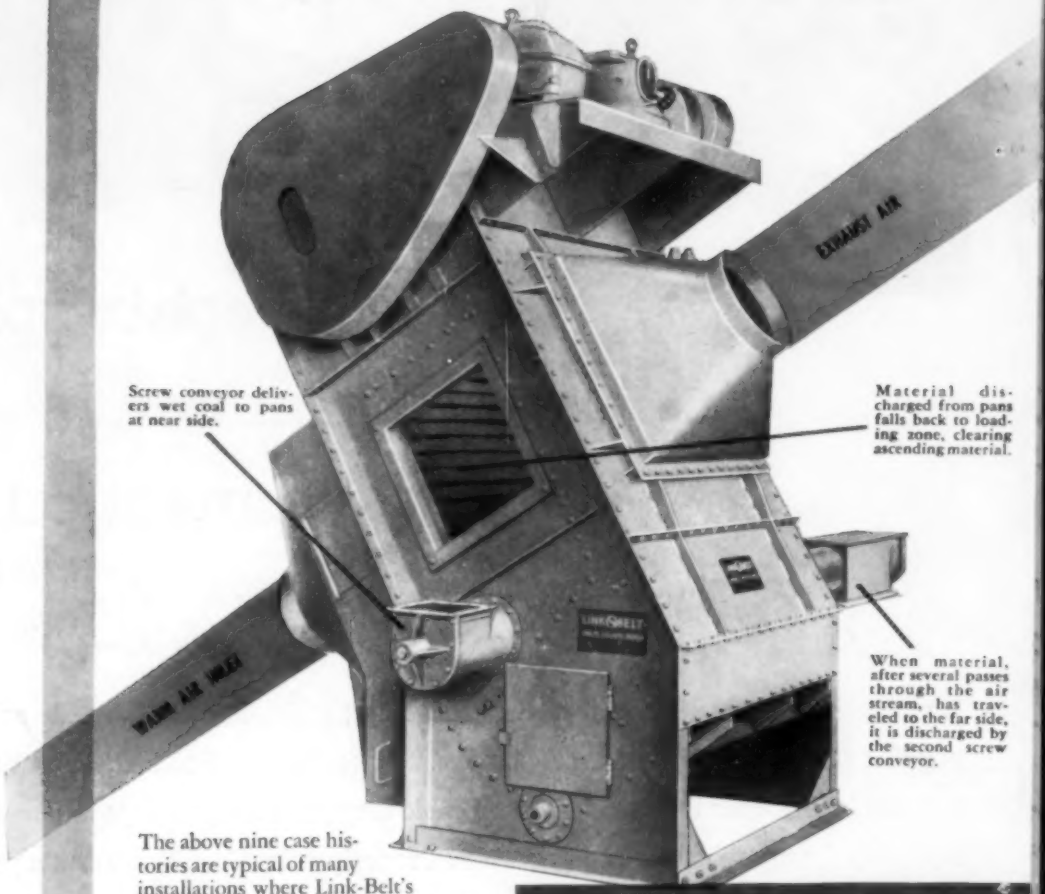
Easier shipping and storage of ⅜" x 0" product because Multi-Louvre efficiently reduces surface moisture.

4 KENTUCKY
Elkhorn No. 3 Seam

Metallurgical coal retains coking qualities as two Multi-Louvres dry ¼" x 0" washed coal.

5 WEST VIRGINIA
Eagle Seam

Dries wide range of sizes—250 tph of 1½" x 0" coal, yet coal discharge temperatures are less than 120° F.


EXHAUST AIR
WARM AIR INLET
LINK-BELT
Screw conveyor delivers wet coal to pans at near side.
Material discharged from pans falls back to loading zone, clearing ascending material.
When material, after several passes through the air stream, has traveled to the far side, it is discharged by the second screw conveyor.

The above nine case histories are typical of many installations where Link-Belt's Multi-Louvre is heat-drying coal successfully. Wherever used in the coal mining industry, this dryer provides an economical means of producing a better and more acceptable product to meet increasingly critical markets. For complete information, call the Link-Belt office near you, or write for Book 2466.

LINK-BELT

COAL PREPARATION AND HANDLING MACHINERY

13,3

LINK-BELT COMPANY: Chicago 9, Birmingham 3, Cleveland 15, Denver 2, Detroit 4, Huntington 9, W. Va., Indianapolis 6, Kansas City 8, Mo., Louisville 2, Pittsburgh 13, Seattle 4, St. Louis 1, Wilkes-Barre, Scarboro (Toronto 13), Springs (South Africa).

6 ILLINOIS
No. 6 Seam

Helps recover marketable fuel formerly wasted. Low power consumption cuts operation costs.

7 KENTUCKY
No. 11 Seam

Increases dry cleaning efficiency by turning out a product of uniformly low moisture content.

8 ILLINOIS
No. 6 Seam

High capacity — 140 tph — makes this Multi-Louvre a profitable investment for preparation plant.

9 WEST VIRGINIA
No. 5 Block Seam

Degradation is minimized as two Multi-Louvre dryers reduce surface moisture of two sizes to 2.0%.